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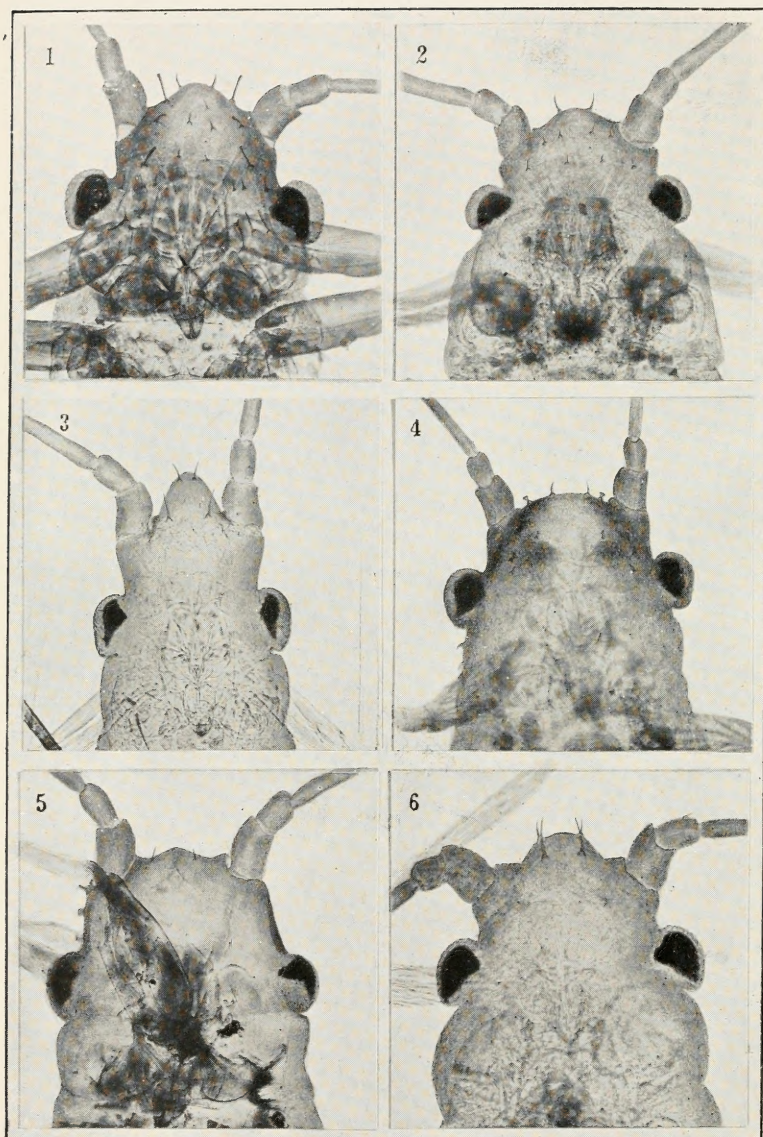
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THE GENUS *SALTUSAPHIS*.

(See p. 8.)

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No. 1

SYNOPSIS OF THE GENUS *SALTUSAPHIS*. (APHIDIDÆ—HOM.).

BY A. C. BAKER, WASHINGTON, D.C.*

The genus *Saltusaphis* was erected by Theobald for his species *scirpus* from Egypt. A study of a number of American species found on sedges and in marshy localities indicates that there are at least five species of this genus in America. Two of these have been already described in other genera, viz., *Brachycolus ballii* Gill. and *Chaitophorus flabellus* Sanb.

Gillette (Ent. News, vol. XXII, p. 441) has also described another species in the genus *Brachycolus*, but this species, *tritici*, seems to be a typical member of the genus and closely related to the type species, while *ballii* on the other hand is not. *Flabellus*, while described as a *Chaitophorus* by Sanborn, has been re-described by Gillette and placed in the genus *Callipterus*. The erection of Theobald's genus leaves little doubt in regard to the true position of *flabellus*. The genus may be defined as follows:

Genus **Saltusaphis**.

Body somewhat elongate; head large, eyes prominent, without ocular tubercles. Thorax large with well-defined segments. Antennæ of six segments, usually as long as the body; legs with the two anterior pairs of femora somewhat swollen. Cornicles short and cup-shaped; cauda knobbed; anal plate widely bilobed, posterior extremity of dorsum of abdomen sometimes indented, often deeply so. Fore wing with the media twice branched, hind wing with one oblique vein near its extremity. Wing veins usually bordered with dusky brown; sexes apterous, living in marshy regions, usually on sedges.

The species of this genus present a very characteristic appearance on their host plant. They lie closely appressed to the leaf with their antennæ stretched out parallel in front of the head. When disturbed or alarmed they fall suddenly, or spring from the

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plant, aided by the large muscles of their anterior and middle femora. All sections of the leaf are attacked, specimens being found close to the ground or far out at the tips of the leaves. The sexes appear on the leaf very similar to the viviparous forms, with the exception of the smaller size. The genus belongs to the Callipterini, but seems to be quite distinct from the other genera in the tribe.

It would appear that Theobald has been led into the error of describing the cauda as bifid by the very marked division on the last abdominal segment in the type species. In examining *scirpus* this is the most apparent structure on the caudal portion of the abdomen. The cauda, however, is distinctly knobbed, and the anal plate in the apterous forms appears almost as two distinct plates. This is more plainly seen in some of the other species than in *scirpus*.

The species may be separated by the following key:

KEY TO SPECIES.

(Based on Apterous Form.)

1. Antennæ not much longer than half the body length, and about equal in length to the distance between the vertex and the hind coxæ.....*ballii* (Gill.).
Antennæ much longer than the distance between the vertex and the hind coxæ, usually as long as the body.....2
2. Posterior extremity of the abdomen quite distinctly bilobed.....3
Posterior extremity of the abdomen not distinctly bilobed.....4
3. Body covered with fan-shaped or sickle-shaped hairs; vertex not strongly conical.....*scirpus* Theo.
Body without hairs excepting simple ones on the caudal portion; vertex strongly conical.....*elongatus* Baker.
4. Body covered with fan-shaped hairs about 0.016 mm. long.....5
Body with slightly knobbed hairs about 0.05 mm. long.....*americanus* Baker

5. Segment III of antenna considerably shorter than width of head across the eyes; colour brownish yellow with blackish markings.....*flabellus* (Sanb.)
 Segment III of antennæ considerably longer than width of head across the eyes; colour pale yellowish green with dusky markings.....*virginicus* Baker.

***Saltusaphis americanus*, n. sp.**

Apterous viviparous female.—General colour reddish yellow; vertex dusky brown, which colour extends caudad on each side to form two large dusky lateral areas on top of head; a rather narrow median area yellow. Thorax with a large, irregular, dark brown patch on each side. Abdomen with similar lateral patches which include the cornicles. Cauda dusky. Femora, proximal extremity of the tibiæ and the tarsi dusky brown. Eyes reddish brown. Antennæ brown with base of III yellowish.

Length from vertex to tip of cauda 1.84 mm.; hind tibia 0.64 mm. Dorsum of body covered with hairs which are situated on rather prominent tubercles. These hairs are about 0.05 mm. long and somewhat expanded at their tips. Extremity of the abdomen scarcely at all divided. Cauda and anal plate usual.

The apterous forms of this species are similar in general appearance to those of *flabellus* Sanb., but are easily distinguished from those of that species by the body hairs.

Apterous male.—General colour similar to that of the viviparous form and with similar markings, but these much fainter. Length from vertex to tip of cauda 1.04 mm.; hind tibia 0.608 mm. Body with hairs of about the same length as those of the viviparous form, but with them little, if at all, expanded at tips.

Antennæ with the following measurements: III, 0.48 mm.; IV, 0.32 mm.; V, 0.32 mm.; VI, (0.128+0.256 mm.). Segments very finely and closely imbricated; III, with 20 to 25 very small, circular sensoria in an uneven row along the segment; IV, with 9 or 10; V, with about 9; VI, with sometimes one on the base of segment beside the usual sensoria at the base of the unguis.

Oviparous female.—Colour very similar to that of the viviparous form, with the colours possibly darker. Length from vertex to tip of cauda 1.6 mm.; antennæ as follows: Segment III,

0.576 mm.; IV, 0.32 mm.; V, 0.304 mm.; VI, (0.16 mm.+0.256 mm.). All segments without sensoria excepting the permanent ones. Body hairs similar to those of the viviparous form. Hind tibiae 0.672 mm.; somewhat swollen and thickly covered on its proximal two-thirds with almost circular or somewhat oval sensoria.

Described from specimens on balsam mounts made by Mr. H. B. Scammell, the specimens taken on bog grass, Whitesbog, N. J., Oct. 21, 1914.

Type in U. S. Nat. Museum Cat. No. 26719.

***Saltusaphis ballii*, (Gill.).**

Brachycolus ballii Gillette, Can. Ent., vol. XL, p. 67; Ent. News, vol. XX, p. 119.

Specimens of this species are in the collection of the U. S. Nat. Museum, taken on *Scirpus sylvaticus* at Richfield Springs, N. Y., by Theo. Pergande, No. 4052, and typical specimens on *Carex nebraskiensis* collected at Ft Collins, Colo., 5-30-10, by Bragg. These later specimens were deposited in the Museum collection as types by Prof. C. P. Gillette. Oviparous females are in the collection taken on 3-square, Whitesbog, N. J., 11-13-15 by H. B. Scammell.

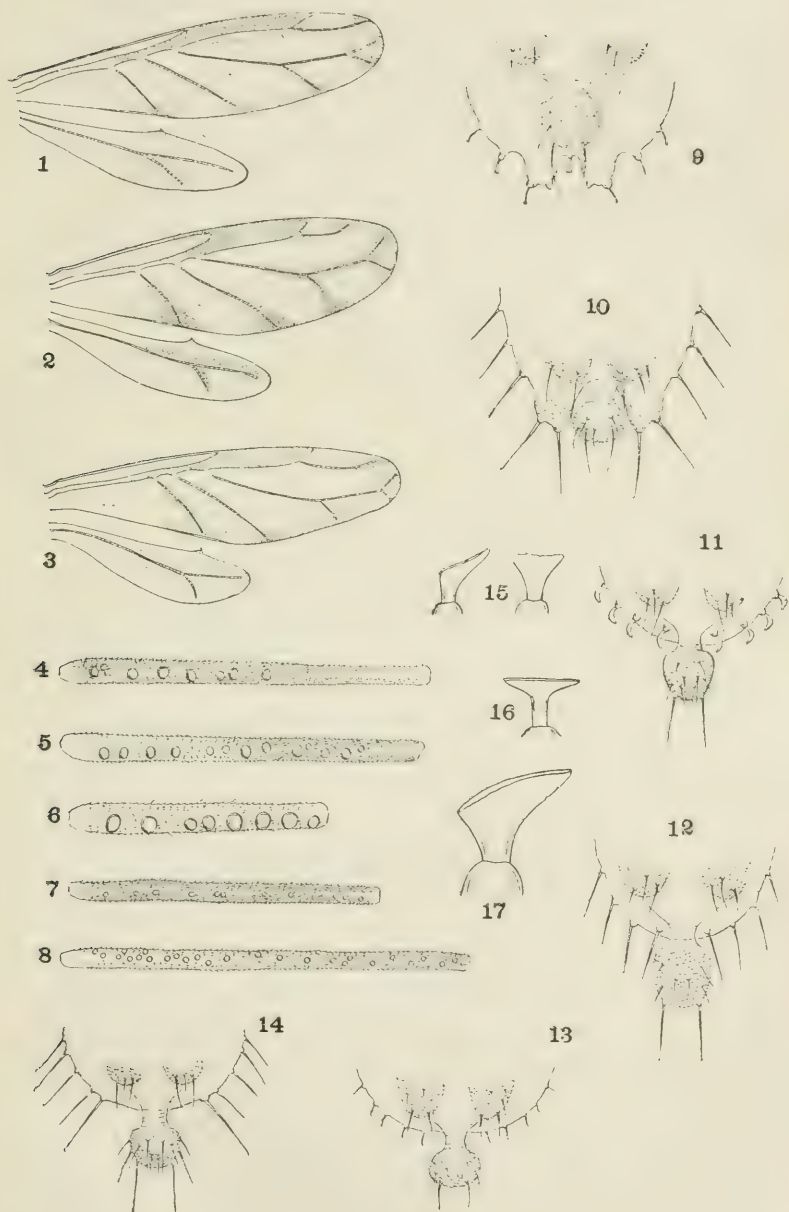
The species has shorter antennae than the other members of the genus, but is very similar in many ways to *americanus* and *flabellus*. The body hairs are short, stout and spine-like.

***Saltusaphis elongatus*, n. sp.**

Only oviparous females of this species have been seen by the writer, but since they are so very different from any of the other species in the genus, no difficulty will be experienced in separating the species at once in this form.

General colour orange yellow, uniform, with the exception of a number of dusky flecks along the margins of the abdomen. Eyes deep wine colour; antennae, from the basal portion of segment III to the tip, dark brown to black.

Length from vertex to tip of cauda 2.34 mm.; hind tibiae 0.64 mm.; scarcely at all swollen, and covered on its proximal portion with a number of sensoria. These are nothing like as abundant as in the species *americanus* and *virginicus*. Antennae as follows:



SALTUSAPHIS—STRUCTURAL DETAILS. (See p. 9)

Segment III, 0.832 mm.; IV, 0.352 mm.; V, 0.4 mm.; VI, (0.176 mm.+0.256 mm.). Vertex much produced, conical, acutely pointed. Cauda and anal plate usual, extremity of the abdomen quite deeply cleft. Body without hairs, excepting at the posterior portion, where it is armed with simple hairs about 0.064 mm. long.

Described from specimens in balsam mounts, the specimens collected by H. B. Scammell and H. K. Plank at Whitesbog, N. J., Oct. 21, 1914. Taken on bog grass.

Type in U. S. Nat. Museum, Cat. No. 20720.

***Saltusaphis flabellus* (Sanb.)**

Chaitophorus flabellus Sanborn—Kans. Univ. Sci. Bul., vol III, No. 1, p. 37.

Callipterus flabellus (Sanb.) Gillette, Ent. News, vol. XX, p. 120.

Specimens of this species are in the collection of the U. S. Nat. Museum as follows: One specimen taken May 4, 1903, host unknown, at Lawrence, Kansas, by C. E. Sanborn, Type. Specimens collected on *Carex* in May, 1911, and deposited in the collection by Prof. Gillette, and specimens collected by Mr. Bragg on *Carex* at Ft. Collins, Colo., 5-6-12, and deposited in the Museum collection by Prof. Gillette.

There is considerable variation in the colour in the different specimens, some being generally mottled on the dorsum, while others have a distinct, heavy marking down each side on the dorsal area. The fan-shaped spines are, however, the same on all.

***Saltusaphis scirpus* Theobald.**

Saltusaphis scirpus Theobald, Bul. Ent. Research, vol. VI, pt. 2, p. 138.

The writer has never seen alate forms of this species, but through the kindness of Mr. J. J. Davis he has been able to examine an apterous paratype. In the bifid nature of the extremity of the abdomen the species is related to *elongatus*. In other characters, however, it is more closely related to *virginicus*. This resemblance is particularly noticeable in the body hairs. On the posterior extremity of the abdomen the hairs are more elongate than elsewhere, measuring fully 0.048 mm. They are somewhat knobbed, even on the posterior extremity. Only the proximal segments

of the antennæ are present on the specimen. These measure as follows: I, 0.112 mm.; II, 0.064 mm.; III, 0.608 mm.; IV, 0.304 mm. Hind tibia 0.592 mm., hind tarsus 0.144 mm.

***Saltusaphis virginicus*, n. sp.**

Alate viviparous female.—General colour yellowish, marked with dark brown; head with smoky to black background and median yellowish stripe; eyes dark reddish brown. Prothorax similarly marked. Thorax yellow with dark brown lobes; abdomen yellow with lateral row of dark brown or black areas, and with a large, longitudinal, central area of the same colour; antennæ almost uniform dusky. Legs dusky, lighter at the joints, cornicles included on each side within one of the lateral dusky areas. Stigma and wing veins smoky, veins slightly bordered with dusky colour.

Length from vertex to tip of cauda 1.44 mm. Antennæ as follows: III, 0.432 mm.; IV, 0.304 mm.; V, 0.288 mm.; VI, (0.192 mm. + 0.176 mm.). All segments very minutely and closely imbricated. Segment III, with 9 or 10 circular to oval sensoria on the basal two-thirds of the segment in an uneven row. Hind tibiæ 0.688 mm.; hind tarsus 0.112 mm. Fore wing 2.16 mm. long by 0.64 mm. wide. Media distinctly angled. Cornicles very shallow and small. Abdomen densely covered with minute projections.

Apterous viviparous female.—General colour yellowish green. Head unmarked, eyes reddish brown. Body almost uniform yellowish in some specimens, while in others faint, longitudinal, dusky lines are present, extending from the head to tip of abdomen. Antennæ with the basal portion of segment III yellowish, the remainder dusky to black. Legs uniform yellowish or with light dusky areas near the distal extremities of the femora and with the tarsi dusky.

Length from vertex to tip of cauda 2.16 mm.; width across abdomen 0.672 mm., vertex somewhat conical; antennæ as follows: III, 0.464 mm.; IV, 0.336 mm.; V, 0.288 mm.; VI, (0.208 mm. + 0.16 mm.). Hind tibiæ, 0.672 mm.; hind tarsus, 0.128 mm.; entire dorsum covered with small, mushroom or fan-like hairs. Posterior extremity of abdomen scarcely indented.

Apterous male.—General colour similar to that of the apterous viviparous female, but with very little of a yellow tint. Segments

of the body indicated by narrow, smoky, cross stripes. Antennæ black with the exception of the basal two segments and the proximal extremity of segment III. A black rim borders the antennal sockets. Eyes dark brown.

Length from vertex to tip of cauda 1.6 mm. Antennæ as follows: Segment III, 0.4 mm.; IV, 0.256 mm.; V, 0.256 mm.; VI, (0.175 mm.+0.144 mm.). Segment III is armed with a row of about 12 sensoria, which are minute and circular. Segment IV is without sensoria or with 2 or 3 very minute ones. Segment V has a row of about 6, while the base of segment VI has usually the same number. Hind tibia 0.56 mm.; hind tarsus 0.112 mm.

Oviparous female.—Colour very similar indeed to that of the male. The femora, however, have a distinct dusky spot near their distal extremity, and the tibiæ are more dusky than those of the male.

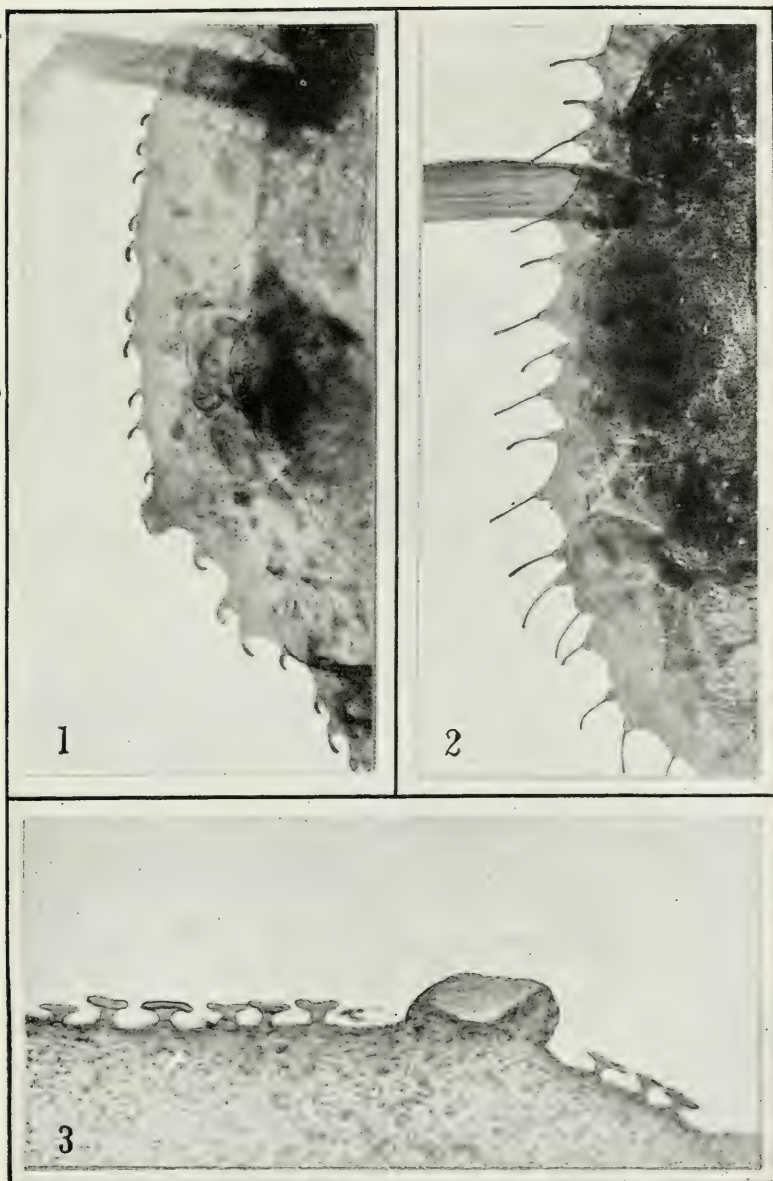
Length from vertex to tip of cauda 1.84 mm. Antennæ as follows: Segment III, 0.416 mm.; IV, 0.304 mm.; V, 0.112 mm.; VI, (0.176 mm.+0.176 mm.). All segments without sensoria, excepting the permanent one. Hind tibia 0.688 mm., somewhat swollen and densely covered with circular, or somewhat elongated sensoria. Body covered with the mushroom-like hairs described in the viviparous forms.

Described from specimens reared by the writer at East Falls Church, Va., during Oct., 1916, on *Carex* sp.

Type in U. S. Nat. Museum Cat. No. 20721.

EXPLANATION OF PLATES I, II AND III.

- Plate 1, Fig. 1. Head of apterous viviparous form of *S. americanus*.
" " 2. Head of apterous viviparous form of *S. ballii*.
" " 3. Head of oviparous form of *S. elongatus*.
" " 4. Head of apterous viviparous form of *S. flabellus*.
" " 5. Head of apterous viviparous form of *S. scirpus*.
" " 6. Head of apterous viviparous form of *S. virginicus*.
Plate 2, Fig. 1. View of portion of abdomen of *S. flabellus* showing hairs.
" " 2. View of portion of abdomen of *S. americanus* showing hairs.
" " 3. View of portion of abdomen of *S. virginicus* showing hairs.



SALTUSAPHIS—STRUCTURAL DETAILS.

(See p. 8.)

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- Plate 3, Fig. 1. Wings of *S. ballii*.
" " 2. Wings of *S. flabellus*.
" " 3. Wings of *S. virginicus*.
" " 4. Segment III of antenna of alate viviparous form of *S. virginicus*.
" " 5. Segment III of antenna of alate viviparous form of *S. flabellus*.
" " 6. Segment III of antenna of alate viviparous form of *S. ballii*.
" " 7. Segment III of antenna of male of *S. virginicus*.
" " 8. Segment III of antenna of male *S. americanus*.
" " 9. Caudal extremity of apterous viviparous form of *S. scirpus*.
" " 10. Caudal extremity of oviparous form of *S. elongatus*.
" " 11. Caudal extremity of apterous viviparous form of *S. flabellus*.
" " 12. Caudal extremity of apterous viviparous form of *S. americanus*.
" " 13. Caudal extremity of apterous viviparous form of *S. ballii*.
" " 14. Caudal extremity of apterous viviparous form of *S. virginicus*.
" " 15. Hairs of *S. scirpus*.
" " 16. Hair of *S. virginicus*.
" " 17. Hair of *S. flabellus*.
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NEW SPECIES OF COLEOPTERA OF THE GENUS MORDELLISTENA.

BY EMIL LILJEBLAD, CHICAGO, ILL.

Material in the family Mordellidæ, one of the most neglected of the families of the Coleoptera, neglected alike both by the collector and the systematist, has long been sought by the writer. Having accumulated a large number of specimens, and the opportunity having been presented to make a thorough study of the forms at hand, not alone in my cabinet but in that of Mr. A. B. Wolcott, a

few strikingly distinct species have been recognized as yet undescribed. These it is deemed expedient to make known now.

Quite a few other supposedly new species remain, but the author considers it the part of wisdom to await the acquisition of more extensive series before settling upon the validity of these forms.

Unless otherwise indicated, the types of the species herewith described were collected by the writer and are to be found in his collection.

***Mordellistena rutila*, sp. nov.**

Hind tibia with two converging oblique ridges; first joint of hind tarsus with three, and the second with one oblique ridge.

Ferruginous; nearly linear; head black, with front slightly ferruginous; thorax and elytra ferruginous, the latter slightly darker towards apex; under surface ferruginous; anal style very short. Length 4 mm.

One specimen from Eggers, Illinois, July 7. Collected by A. B. Wolcott, in whose collection the type is placed.

This species is most nearly allied to *Mordellistena tosta*, but differs in having the tibial ridges converging, no trace of a third ridge, and the second joint of hind tarsus with only one ridge. It is longer, nearly parallel, and with the head black.

This should be placed in collections after *M. atriceps*.

***Mordellistena exilis*, sp. nov.**

Hind tibia with two equal parallel ridges; first joint of hind tarsus with four, second with two ridges.

Black; nearly linear; head, mouth-parts and thorax ferruginous, the last with a black median line reaching to middle; antennæ a little darker at apex; front legs and middle femora ferruginous, the middle tibia and tarsi darker; hind femora and apex of tibia and tarsal joints black. Elytra black, with testaceous pubescence. Beneath black, with coarser testaceous pubescence; anal style long and slender. Length 4 mm.

One specimen from Ft. Sheridan, Illinois, August 7.

This species has the form and size of *Mordellistena marginalis*, but is at once distinguished by the tibial ridges.

This is to follow *M. tosta* in a systematic arrangement.

Mordellistena rufa, sp. nov.

Hind tibia with two ridges, the anterior extending across the outer face of the tibia; first joint of hind tarsus with four and the second with two ridges.

Ferruginous; elytra with the lateral margins from base to the middle and the suture black. Mesosternum black; hind coxal plate and abdomen clouded with black; anal style long and slender. Length 4 mm.

One specimen from Palos Park, Illinois, May 28.

This species resembles *M. ustulata*, differing only in the ridges. It should follow *M. splendens*.

Mordellistena insolita, sp. nov.

Hind tibia with three oblique ridges, the upper one less developed; the first and second joints of hind tarsus with three and the third with two small ridges.

Subcuneate; head, thorax, anterior and middle femora ferruginous, tibia and tarsi darker; hind legs and under surface black, with cinereous pubescence. Elytra black, with silky, iridescent pubescence; anal style black, long and slender. Length 5 mm.

Two specimens from Lee County, Texas, April 1. Collected by Rev. G. Birkmann. Paratype in collection of A. B. Wolcott.

This species somewhat resembles *M. texana*, but differs in the tibial and tarsal ridges, *texana* having four ridges on the tibia, and not any ridge on the third joint of the hind tarsus. It should follow *M. singularis*.

Mordellistena vera, sp. nov.

Hind tibia with three oblique ridges and a rudiment of a fourth; first joint of hind tarsus with four, second with two, and third with two ridges.

Black; head and thorax sparsely covered with testaceous pubescence; base of antennæ, mouth-parts and legs reddish brown. Elytra covered with silky, reddish-brown pubescence, more densely on the suture, and forming a narrow, sutural line. Beneath black, with testaceous pubescence; abdominal segments reddish at apex; anal style long and slender. Length 5-5.5 mm.

Three specimens. Type from St. Louis, Missouri, July 7.

Paratypes from Paw Paw Lake, Michigan, August 18, and Evanston, Illinois, July 2; the latter in collection of A. B. Wolcott.

Nearest allied to *M. unicolor*, but differs in size, being much longer, more robust and having two ridges on the third joint of hind tarsus. It should follow *M. schauppii*.

***Mordellistena pulchra*, sp. nov.**

Hind tibia with three oblique ridges, the upper more oblique; first joint of hind tarsus with four, second with three oblique ridges.

Black; head ferruginous, with a dark cloud on vertex; mouth-parts dark; thorax rufous, with a narrow margin, the base, apical angles and a median line black; antennæ dark brown; first and middle legs with femora black, the tibia and tarsi ferruginous; hind legs ferruginous, the tarsal joints black at apex. Elytra black, with fine cinereous pubescence; a wide rufous vitta from base nearly to apex. Beneath black, with sides of hind coxal plates and basal joints of abdomen ferruginous; anal style short and slender, apical two-thirds black. Length 4 mm.

One specimen from Bowmanville, Illinois, August 18.

Judging from the original descriptions, this species has the colour and size of *M. attenuata* Say or *vittigera* Lec., but the tibial and tarsal ridges are entirely different. It should follow *M. æqualis*.

***Mordellistena wolcotti*, sp. nov.**

Hind tibia with three rather short, oblique ridges, which extend only one-third across the outer face of the tibia, and two small rudimentary ridges; first joint of hind tarsus with six ridges, three small or rudimentary; second joint with two ridges.

Form robust; head and thorax black, coarsely covered with silky, yellowish pubescence; base of antennæ and mouth-parts ferruginous; legs fuscous. Elytra rufous, slightly darker towards apex, with the base, suture, an oblique vitta from humerus to the middle, and a slightly oblique band behind the middle and apex, with silky, golden-yellow pubescence; beneath black, with yellowish pubescence; anal style long and slender, fuscous. Length 4.5 mm.

One specimen from McGregor, Iowa, July 16. Collected by A. B. Wolcott, in whose collection the type is placed.

This species is very unique, and I do not know of any described species that it at all resembles. It should follow *M. pulchra*.

***Mordellistena gigas*, sp. nov.**

Hind tibia with four very oblique ridges; first joint of hind tarsus with five, second with two, and third with one oblique ridge.

Subcuneate; head, thorax, mouth-parts, base of antennæ, and legs rufous. Elytra black, finely punctured, with reddish brown iridescent pubescence; basal margin, a short oblique humeral vitta, narrow lateral margin and entire suture with golden yellow pubescence. Beneath testaceous; mesosternum, hind coxal plates, and the basal margins of first and second segments of abdomen fuscous; anal style fuscous at apex. Length 6 mm.

One specimen from Edgebrook, Illinois, July 10.

This is one of the largest species of *Mordellistena* I have seen. It is likewise a very handsome species, and may readily be recognized by its distinct colour and number of ridges. It should follow *M. fusco-atra*.

RECENT STUDIES OF CANADIAN SPIDERS.

BY J. H. EMERTON, BOSTON, MASS.

For many years past I have worked on the spiders of New England, and as these have become better known and the collections more complete, have from time to time wandered over into adjoining territory. In the summer of 1916 I made a visit to the neighbouring part of Canada, with the object of seeing where and how far the familiar species extended in that direction. All authorities agreed that it was best to start early, so the cold and rainy weather of the middle of June found me at Ottawa, in company with Mr. W. T. M. Forbes, the lepidopterist, consulting with the resident entomologists where it was best to go and how to get there. The Ottawa Field Club had an outing the next day, and in that helpful company I began operations at the Experimental Farm, the umbrella, which had become a constant companion, serving to catch the spiders shaken from hedges and the specimen trees of the Arboretum. As the weather improved, Mr. Gibson took us to the old lumber camp in Chelsea and up King's Mountain, and later I

went north to the end of the railroad at Maniwaki. At Montreal, after a day in the cleared-up shrubbery of Mt. Royal and a fruitless visit to St. Hilaire, we, at last, with the help of Mr. Winn and Mr. Corcoran, found the way to some still unspoiled country on the farther side of Westmount, where, in a boggy wood, we found the same forest spiders as in the uncultivated spots at Ottawa and Hull. Consulting with the Montreal entomologists about the hilly country to the north we were recommended to Montfort, which proved to be an excellent collecting ground, with ponds and bogs 1,500 feet or more above the sea and a fauna of a more northern character than Montreal. Next we went to Sherbrooke and Megantic, but met wet weather again and only got a few samples of the local spiders. At Quebec, however, there was a week of fine weather, and following the directions of Mr. Boulton I explored the Gomin log, and went for a couple of days to Beaupré and up Cap Tourmente. My time was now getting short, but I took the steamboat up the Saguenay and spent a day at Chicoutimi and in a flying visit to Lake St. John. About a hundred species of spiders were taken during this trip, and nearly all of these were species well known in Maine and New Hampshire, and most of them all over New England and New York. A little north of the St. Lawrence River and up out of the valley were a few species which occur only in Northern Maine and the upper forests of the White Mountains. Probably nearly all the species known in New England extend much farther north and west, and fifty of them are already known to extend across Canada to the Rocky Mountains, most of them following the southern border of the spruce forest belt. The best examples of these are two species which live in cobwebs between the branches of small spruce and balsam trees and are comparatively easy to find. Their distribution, as far as known, is shown on the maps. One, *Theridion zelotypum*, extends over the whole of Maine except the southwest corner. It crosses New Hampshire at Lake Umbagog and Dixville Notch and extends north of the Canadian boundary as far as Ottawa. It does not occur in the White Mountains, the Adirondacks, Northern Vermont nor around Toronto. Farther west it begins again at Nipigon, on Lake Superior, and continues westward in spruce bogs to Prince Albert, Athabaska Landing, and Jasper Park in the Rocky Mountains.

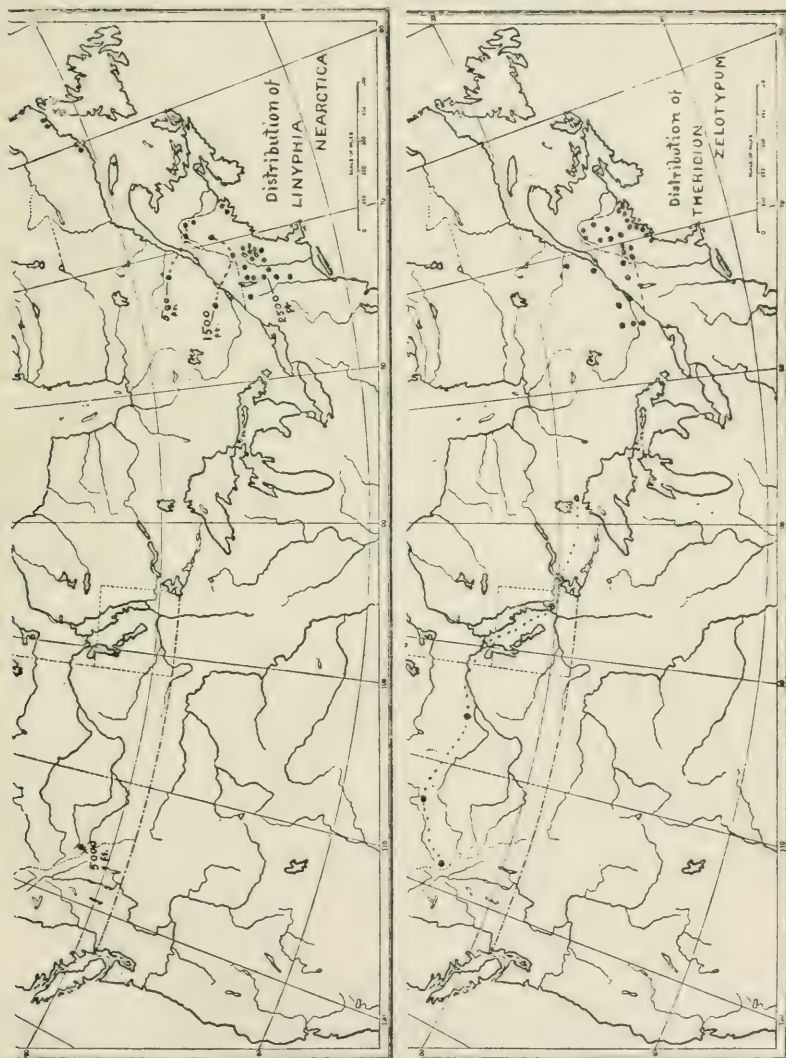


Fig. 1.—Distribution of *Theridion zelotypum* and *Linyphia nearctica*

Its northern limits are unknown. The other species, *Linyphia nearctica*, lives in the forests of the New England mountains from 2,500 feet up to 4,500 feet, or as far as trees grow. At Montfort, in the hills north of Montreal, at Dixville Notch and on Mt. Kinca, Me., it comes down to 1,500 feet. At Lake St. John and in Northern Maine it lives at the general level of the country, below 500 feet, and on the coast of Labrador and at Eastport, Me., at the sea level. Its range westward has not been traced, but it occurs at Laggan in the Rocky Mountains at an elevation of 5,000 feet.

As the maps show, there are gaps to be filled in the distribution of even these common species. The *Theridion* probably follows westward along the Ottawa River and Lake Huron to Lake Superior. The *Linyphia* probably crosses Ontario farther north, perhaps along Hudson Bay. These two species outline, as well as anything does, the so-called Canadian life zone. South of it another set of spiders occupy the country, and some of the species common in the meadows of Boston or Toronto are also common around the ponds of Edmonton. On the west coast another fauna extends north to Alaska and its species mix through the mountains with the other groups, some as far east as Medicine Hat. On the east coast, arctic species extend southward along the shores of Labrador and Newfoundland as far as Maine. I have tried to give here the outlines that the study of Canadian spiders has to fill in, and it is gratifying to see how much is being done in this interesting field. At the Park Museum in Banff there is already a local collection of over fifty species, which is increased every season by the curator, Mr. Sanson. At the Royal Ontario Museum in Toronto is a larger local collection and an interesting set of spiders from various points across the country from Nipigon to Vancouver Island, collected chiefly by Mr. T. B. Kurata. At Ottawa are the spiders collected before 1890 by J. B. Tyrell and other early explorers of the Geological Survey, and more recent collections made in the way of their other work by entomologists in all parts of the Dominion. Small collections of Canadian spiders from several correspondents are coming in this winter, and I am beginning to think about another summer excursion in Canada.

POPULAR AND PRACTICAL ENTOMOLOGY.

THE PLUM CURCULIO IN ONTARIO, NATURE AND EXTENT OF THE
INJURIES, CONDITIONS FAVOURING THE INSECT, AND
MEANS OF CONTROL.PART II—CONDITIONS FAVOURING THE INSECT, AMOUNT OF
DAMAGE DONE, AND MEANS OF CONTROL.

BY L. CAESAR, GUELPH, ONT.

(Continued from vol. XLVIII, page 400.)

As the Curculio winters, in the adult stage, under rubbish or in any good hiding place, and as the better the opportunities for good winter quarters the larger number of beetles that will come safely through the winter, we should naturally expect that orchards or parts of orchards bordering on thick woods, or waste places where long grass, weeds, brush or other rubbish abounds, or orchards that are badly neglected and have an abundance of weeds and rubbish within their own borders, would be worst infested. Such is the case, for, as a rule, in Ontario it is only orchards of this type that do suffer much from the Plum Curculio.

AMOUNT OF THE INJURY.

No accurate estimate of the amount of injury has been made for the Province as a whole, but I believe I am right in saying that the fruit in well-cultivated and well-sprayed orchards with clean surroundings suffers only to a very small extent, probably not more on an average than 1% to at most 5%. On the other hand the loss in neglected orchards or in the parts of well-cared-for orchards immediately adjoining ideal winter quarters for the beetle is sometimes very great. Under such circumstances apricots, plums and sweet cherries sometimes have almost every fruit stung and destroyed, and nearly half of the apples, even on trees that are heavily laden, may be attacked and drop, or if the crop is a light one nearly all may be destroyed.

The injury in the fall and late summer to peaches and apples seems to vary with the season. This year in the Niagara District in orchards where there is no doubt at all that there were thousands of new beetles in August and September, very little injury was done, only an occasional apple here and there, even in the dirtiest of sur-

roundings, being attacked, though in rearing cages the beetles fed freely upon the fruit. Some years, however, the beetles do a great deal of damage in late summer and autumn. For instance, in Prince Edward County one fruit-grower to whom I showed the sort of injury done by the beetles at that time of the year, stated that he had that year 15 tons of apples rendered culls by such injuries. Next year, after he had carried out the suggestions given below for control, he reported very little loss.

MEANS OF CONTROL.

1. *Natural enemies*.—There is no doubt that climatic conditions, as they vary from year to year, play a very important part in determining the relative abundance or fewness of these insects. They are also held in control to some extent by various predaceous and parasitic insects and by other animals, but not to such a degree as to allow us to rely on them alone.

2. *Clean surroundings*.—The first step in the control of the Curculio should be a general cleaning up of the orchard itself and of its surroundings so far as this is practicable. Get rid of all rubbish, cut down thickets, remove stone piles, burn off old grass and all brush. In this way the favourable conditions for hibernation are removed.

3. *Cultivation*.—It is seldom that one sees a well-cultivated orchard badly infested. Cultivation, especially if it can be continued into the month of July without danger of winter injury to the trees, will kill the pupæ in their easily broken earthen cases in the soil. It also seems to help in other ways, and by letting the sunlight beat upon the fallen, infested apples and killing the larvæ within by the excessive heat. Good pruning would also help in this way.

4. *Spraying with arsenicals*.—The best spray to use is arsenate of lead at the strength of from 2 to 3 lbs. to 40 gallons of dilute lime-sulphur (strength 1.008 sp. gr.) or Bordeaux mixture. The lime-sulphur or Bordeaux is added to control diseases. Fortunately the proper time to spray apples for this pest is just after the blossoms have fallen, which is, of course, the right time for the Codling Moth, and also one of the most important times for the scab fungus. The spraying, to get best results on all three things, should be very heavy

and thorough. If this work is well done, only in very badly infested orchards will it have to be repeated. In the latter case the best time to give the extra application will be in about 12 or 14 days after the one just mentioned. Plums and cherries should be sprayed with the same mixture, first, as soon as the fruit has set and the calyces have fallen, and then again in about two weeks' time. Occasionally a third application two weeks later may be desirable. Peaches should be sprayed soon after the fruit is well set and all the enveloping parts of the flower have dropped, so that the poison can cover the whole fruit. No lime-sulphur should be used, but only water or water with 1 or 2 lbs. of freshly slaked lime to every 40 gallons. One spraying is sufficient for Ontario conditions if well given. Many peach orchards do not require any spraying for this pest.

It is well to remember that all the above methods should be combined in the control of the Plum Curculio, for spraying alone though it will reduce the number of the insects will not thoroughly control them, and experience has shown that cultivation and clean conditions in and around the orchard are of very great value. Jarring used to be recommended, but in the writer's opinion is impracticable under modern conditions of fruit-growing.

THE SHELL-BARK HICKORY MEALY-BUG.

BY A. H. HOLLINGER, UNIVERSITY OF MISSOURI, COLUMBIA, MO.

(Continued from vol. XLVIII, page 413.)

DESCRIPTION OF ADULT FEMALE.

Adult female when mounted: varying from 2.6 mm. x 2.2 mm. (at the beginning of oviposition) to 5.7 mm. x 2.4 mm. (at the height of oviposition). Beak well developed and two-segmented, about 175 x 235 microns, the distal segment being about as long as the beak is wide; numerous setæ are borne on the beak; innumerable body setæ, averaging about 50 microns long, occur on both surfaces of the derm; in addition, innumerable, small (2 to 3 microns), obscurely triangular gland-pores occur all over the derm; also some slightly larger, circular gland-pores are in the cephalic region, and also along each abdominal segment and scattered

through the thoracic region; antennae of two formulae; 82137546 and 8(21)37564, (see figure 2, h); the graphic representation of

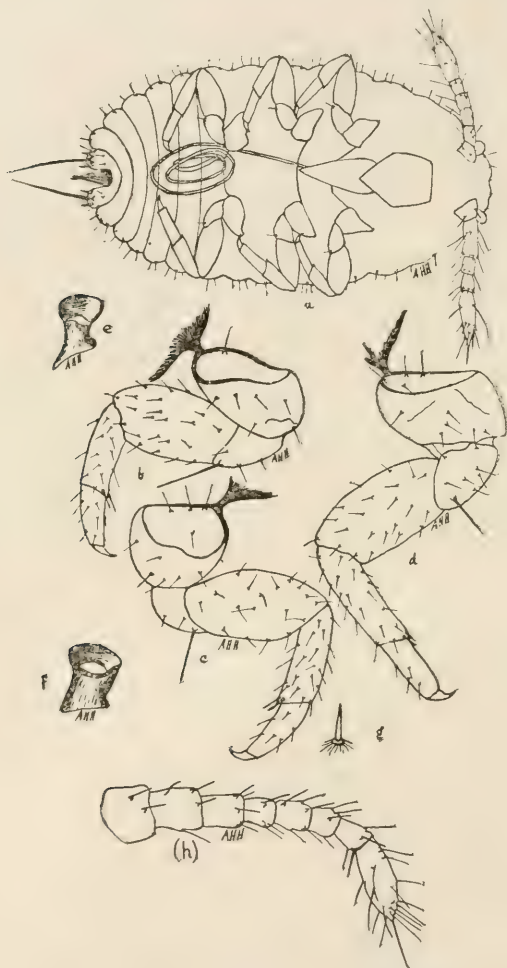


Fig. 2.—*Pseudococcus jessica*, n.sp.; adult female.

the antennal segments as per diagram, (see figure 3); each segment bears several setae and is relatively stout, the width of the

antennae averaging about 45 microns; the legs are relatively short and thick set, the extreme measurements being as follows:

	Coxa.	Tro.	Femur.	Tibia.	Tarsus.
Prothoracic leg (see figure 2, b).....	88 x 126 103 x 126	103 x 59 115 x 50	188 x 100 206 x 100	147 x 50 144 x 44	94 x 35 100 x 41
Mesothoracic leg (see figure 2, c).....	94 x 141 118 x 150	109 x 59 118 x 74	206 x 106 221 x 109	141 x 53 173 x 50	87 x 44 106 x 38
Metathoracic leg (see figure 2, d).....	112 x 147 123 x 141	112 x 65 129 x 77	206 x 103 235 x 109	159 x 50 188 x 56	103 x 38 118 x 47

Tarsal claws vary from 32 to 40 microns; legs bearing numerous setae; the anal lobes are undeveloped, but each bearing its usual long seta, 132 microns long; setae of the genital opening are about 100 microns long; spiracles stout with undeveloped, cup-shaped disc,

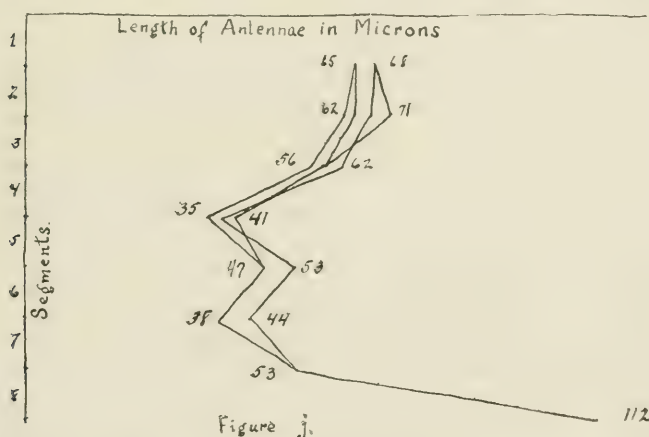


Fig. 3.—*Pseudococcus jessica*, n.sp.; measurements of antennal segments.

see figures (e) and (f); body setae, in caudal region especially, numerous and well developed; "circumgenital" type of gland-pores are located in the region of the genital opening but are not numerous, being scattered; cerari developed only in the caudal region, (see figure 2, g, which represents a conical seta of the anal cerari.)

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA).
PART II.*

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

This paper is a continuation of the first part under this title (Can. Ent., vol. XLVIII, pp. 42-53, February, 1916). Unless stated otherwise the types of the new species are in the collection of the author.

Family *Tipulidæ*.Subfamily *Limnobiinæ*.Tribe *Limnobiini*.Genus *Dicranomyia* Stephens.***Dicranomyia mel'eicauda*, sp. n.**

Antennæ black throughout; thorax dark brown, the mesonotal stripes very dark brown, wings with the stigma short, oval, very dark brown; abdomen dark brown with the ventral lobes of the male hypopygium light yellow

Male.—Length 5.8-6.7 mm.; wing 6.5-7.6 mm.

Rostrum and palpi black. Antennæ black throughout; segments of the flagellum uniformly oval. Head black with a very sparse, grayish bloom.

Mesonotum dark brown with a golden yellow bloom, most apparent on the lateral margins of the præscutum and the median area of the scutum, præscutal stripes shiny, dark brown, particularly without pollen; scutellum dark brown, postnotum with a dense, yellowish gray bloom. Pleura dark brownish black with a grayish bloom on the posterior sclerites, more golden yellow on the anterior sclerites. Halteres dark brown, the base of the stem more yellowish. Legs with the coxæ brown, sparsely gray pruinose; trochanters and femora dull yellow, the latter soon passing into dark brown; tibiæ and tarsi dark brown. Wings with a slight dusky or grayish tinge; stigma very prominent, oval, dark brown; veins dark brown. Venation: *Sc* short, ending about opposite the origin of the sector; *Sc*₂ rather distant from the tip of *Sc*₁, this distance about equal to the short, oval stigma; *Rs* elongate, arcuated at origin, more than twice the length of the basal deflec-

* Contribution from the Entomological Laboratory of Cornell University.
January, 1917

tion of R_{4+5} ; basal deflection of Cu_1 at the fork of M ; cell $1st\ M_2$ closed.

Abdomen black, the basal segments indistinctly reddish medially, the caudal margins pale; basal sternites yellowish, the apical segments dark brown. Male hypopygium with the fleshy ventral lobes bright honey-yellow, the remainder of the hypopygium black, in great contrast with these lobes.

Habitat.—Colorado.

Holotype, ♂, Bear Creek, Morrison Co., Colorado; October 20, 1915 (Osler).

Allotype, ♀, with the type.

Paratopotypes, 20 ♂ ♀.

Tribe *Antochini*.

Genus *Antocha* Osten Sacken.

Antocha monticola, sp. n.

Antennae brown; head grayish yellow; thoracic dorsum without stripes.

Male.—Length 5.5 mm.; wing 7.1 mm.

Female.—Length 5–6.4 mm.; wing 7–8 mm.

Rostrum and palpi dark brown. Antennae dark brown with a coarse, white pubescence; flagellar segments rather small, the two or three apical segments longer than those segments immediately before them. Head grayish yellow, with an indistinct, narrow, dark brown median line.

Pronotum dark brown. Mesonotum light brownish yellow without distinct stripes; median area of the praescutum behind more grayish pruinose; scutum light yellow, the median area grayish pruinose; scutellum yellowish white; postnotum brown. Pleura pale grayish yellow. Halteres short, pale yellow, the knobs brown. Legs with the coxae pale yellow; femora yellow, a little darkened apically; tibiae brownish yellow, slightly darker at the extreme tips; tarsi dark brown. Wings whitish opalescent; stigma elongate, indistinct, yellowish; veins pale brown. Venation: cross-vein r present; cell $1st\ M_2$ small; basal deflection of Cu_1 before the fork of M .

Abdomen brownish yellow above, the apical segments darker; hypopygium orange.

Habitat.—Colorado.

Holotype, ♂, Platte Canyon, Colorado; July 17, 1915 (Osler).

Allotype, ♀, with the type.

Paratopotype, ♀.

Differs from *A. saxicola* O. S. of Eastern North America in the antennal flagellar segments less elongated and paler coloured; head more yellowish, the thorax without stripes, etc.

Tribe *Eriopterini*.

Genus *Ormosia* Rondani.

***Ormosia nimbipennis*, sp. n.**

Coloration reddish brown; wings dusky gray; cell *1st M*₂ of the wings open, the outer deflection of *M*₃ lacking; anal veins convergent.

Male.—Length 4 mm.; wing 5.8–6 mm.

Female.—Length 5.4 mm.; wing 6.3 mm.

Rostrum dull yellow; palpi brown. Antennæ moderately elongate, uniform dark brown throughout. Head brownish gray.

Mesonotum reddish brown without distinct stripes; interspaces with a dense, yellow pilosity; tuberculate pits remote from the anterior margin of præscutum and closely approximated, separated from one another by a distance about equal to one-half the diameter of one; pestnotum with a slight grayish pruinosity. Pleura pale brown with a sparse, gray pruinosity; sternum dull yellow. Halteres pale yellow. Legs with the coxæ and trochanters dull yellow; femora dull yellow, only a little darkened apically; tibiæ and tarsi dark brown. Wings dusky gray; costal region and the stigma brownish; veins dark brown; wing membrane with abundant, short, appressed, black hairs. Venation: cell *1st M*₂ open, the outer deflection of *M*₃ being absent; cross-vein *r* usually a little shorter than the portion of *R*₂ before it; *R*₂₊₃ about equal to the deflection of *R*₄₊₅; petiole of *M*₂ short, less than the basal deflection of *Cu*₁; anal veins convergent.

Abdomen dark brown, the hypopygium a little lighter; hypopygium with the pleural appendages acicular at their apices, black; a prominent median appendage, rectangular, the base and head slightly expanded, the latter squarely truncated or slightly concave across the tip.

Habitat.—Northeastern United States.

Holotype, ♂, Woodworth's Lake, Fulton Co., New York; altitude 1,600 feet; August 13, 1916 (Alexander).

Allotype, ♀, with the type.

Paratopotypes, 10 ♂ ♀.

***Ormosia mesocera*, sp. n.**

Related to *O. monticola* O. S.; antennæ shorter and the flagellar segments not so greatly attenuated; wings more nearly hyaline.

Male.—Length 3.7–3.8 mm.; wing 4.4–4.8 mm.

Rectrum and palpi dark brown. Antennæ dark brown; segments only moderately elongated, not greatly attenuated as in *monticola*; each flagellar segment with a slight, apical, narrowed stem that is equal to about one-half the basal swelling; each segment with abundant rather short hairs and verticils. Head dark brown.

Pronotal scutellum dull, light yellow. Mesonotum reddish with a sparse, gray bloom; thoracic stripes indistinct. Pleura pale brown, very sparsely gray pruinose. Halteres short, the knobs large, pale brown. Legs with the coxæ and trochanters pale yellowish brown; femora dark brown, paler basally; tibiæ and tarsi brown. Wings pale grayish subhyaline, the costal region and stigma more brownish; veins dark brown. Venation: cell 1st *M*₂ open; anal veins slightly convergent.

Abdomen dark brown, the hypopygium a little more reddish. Hypopygium with the pleural appendages short, blunt, slightly curved.

Habitat.—Northeastern United States.

Holotype, ♂, Simmon's Woods, Gloversville, Fulton Co., New York; altitude 900 feet; June 22, 1916 (Alexander).

Paratopotype, ♂.

Related to *O. monticola* O. S. (Mon. Dipt. N. Am., pt. 4, pp. 145, 146; 1869), but the antennal segments much shorter, the individual segments of the flagellum not greatly attenuated and with the hairs and verticils shorter; no indication of the paler apices to the flagellar segments, and the hypopygial details different.

O. monticola is a late summer species, most abundant in August; *O. mesocera* appears to be more vernal in its appearance on the wing.

***Ormosia megacera*, sp. n.**

Related to *O. divergens* Dietz; antennæ of the male elongated, nodulose; anal veins strongly divergent; body coloration dark brown; appendages of the male hypopygium strongly curved.

Male.—Length 3.3–3.7 mm.; wing 4.8–6 mm.

Rostrum and palpi short, dark brown. Antennæ dark brown; flagellar segments greatly elongated, tapering at both ends, especially apically; hairs and verticils on the segments as long as the segments themselves; whole antennæ nearly as long as the body. Head dark brown.

Pronotum pale whitish. Mesonotal præscutum dark brown with three still darker brown stripes, the median one very broad; scutum brown, the lobes with darker centres; scutellum and postnotum dark brown, sparsely gray pruinose. Pleura and sternum dark brown, rather heavily gray pruinose; dorso-pleural membranes dirty yellow. Halteres dark brown, the extreme base yellowish. Legs with the coxæ pale gray; trochanters and femora pale, the latter darker apically, tibiæ and tarsi dark brown. Wings almost hyaline, but with a faint, gray tinge; costal area a little more suffused; stigma ill-defined; veins dark brown. Venation: cell *1st M*₂ open, the outer deflection of *M*₃ lacking; anal veins strongly divergent; *2nd A* short and straight.

Abdomen dark brown, including the hypopygium; hypopygium with the pleural appendages black, in the form of chitinized hooks that are strongly curved.

Habitat.—Northeastern United States.

Holotype, ♂, Simmon's Woods, Gloversville, Fulton Co., New York; altitude 900 feet; June 22, 1916 (Alexander).

Paratopotypes, 2 ♂'s.

Related to *O. divergens* Dietz (Trans. Am. Ent. Soc., vol. 42, p. 144; 1916) which is reddish brown in colour, and the hypopygium of the male very differently constructed.

Genus *Trimicra* Osten Sacken.

***Trimicra angularis*, sp. n.**

Antennæ black; head yellow with a black median line; præscutum yellow with three dark brown stripes; pleura yellow with two stripes; abdomen yellow with the segments marked with brown; wings gray with sparse brown markings.

Male.—Length 5 mm.; wing 5.2 mm.

Rostrum and palpi brown. Antennæ with the first segment yellowish; remainder of the antennæ dark brownish black, the flagellar segments short-cylindrical. Head broad, light yellow, palest on the front, richer on the vertex and occiput; a dark brown linear mark on the head.

Mesonotal præscutum light yellow, with three very broad, dark brown stripes that are confluent behind, the middle stripe ending before the transverse suture; tuberculate pits at nearly mid-length of the sclerite, rather linear, separated by a distance equal to nearly twice the short diameter of one; scutum light yellow, the lobes largely dark brown, this consisting of two confluent blotches; scutellum light yellow, broadly dark brown medially, broadest anteriorly; postnotum yellowish basally, brown caudally. Pleura yellow with two indistinct and somewhat interrupted lateral stripes, the dorsal one passing above the root of the halteres, the ventral one including the sides of the sternum; sternum yellow, except the sides and a narrow, dark brown, median line on the mesosternum; dorso-pleural membranes dusky. Halteres yellow. Legs with the coxæ and trochanters light yellow; remainder of the legs broken. Wings broad, the anal angle prominent; membrane light gray with small, grayish brown spots as follows: At the origin of R_s , at r , tip of R_1 , fork of R_s , along the cord and outer end of cell 1st M_2 ; veins dark brown. Venation: Sc_2 far removed from the tip of Sc_1 , lying just distad of the origin of R_s ; r lying far from the tip of R_1 , this distance equal to about one-half of R_s ; cell 1st M_2 closed, narrowed at its inner end; basal deflection of Cu_1 far before the fork of M ; second anal slightly bisinuate.

Abdominal tergites dull yellow, more brownish basally, a dark brown median blotch on each segment; sternites dull yellow, dark brown medially, the apical segments clearer yellow. Hypopygium with two broad, flattened lobes under the 9th tergite, these heavily chitinized on their dorsal edges; pleurites long, slender, somewhat digitiform; appendages black.

Habitat.—Utah.

Holotype, ♂, mouth of Bear River, Utah; Sept. 16, 1914 (A. Wetmore).

Type in the collection of the United States Biological Survey.

The reference to *Trimicra* is somewhat provisional, although probably correct.

Genus *Rhabdomastix* Skuse.

Subgenus *Sacandaga* Alexander.

***Rhabdomastix flava coloradensis*, subsp. n.**

Allied to *R. flava flava*; antennal flagellum black; pleurae white-pruinose; femora and tibiae tipped with brownish; wings with R_2 almost perpendicular to R_{2+3} ; R_3 almost straight; m very long.

Male.—Length 5.5 mm.; wing 6.9 mm.

Rostrum and palpi brown. Antennae with the first scapal segment yellowish, the remainder of the organ black. Head pinkish gray with a very narrow and indistinct median line of darker.

Pronotum yellowish, a little browner medially, the sides of the scutellum whitish. Mesonotal praescutum dull whitish yellow, dusted sparsely with a grayish pollen, and with three broad, reddish-brown stripes; the broad, middle stripe ends far before the transverse suture and is slightly bifid caudally; scutum with the median area whitish, the outer lateral portions of the lobes dark brown; scutellum bright yellow; postnotum reddish brown, sparsely pruinose. Pleura yellow, more bluish white pruinose on the mesopleurites. Halteres light yellow. Legs with the coxae brownish; trochanters dull yellow; femora light brown, broadly tipped with dark brown; tibiae brown, very narrowly tipped with darker; tarsi brown. Wings opalescent, subhyaline; costal region a little more yellowish; stigma ill-defined, yellowish brown, veins dark brown. Venation: R_2 short, almost perpendicular to R_{2+3} at the fork; cross-vein m very long so that the outer deflection of M_3 is greatly reduced, almost punctiform.

Abdominal tergites brownish yellow; sternites a little brighter.

Habitat.—Colorado.

Holotype, ♂, Platte Canyon, Colorado, July 17, 1915 (Osler).

Close to typical *flava* Alexander of Northeastern America, but sufficiently distinguished by the black antennal flagellum, the mesopleura more whitish pruinose, the femora and tibiae tipped with brown and in the slightly different venational details.

Genus *Crypteria* Bergroth.***Crypteria americana*, sp. n.**

Body coloration reddish, wings subhyaline, the radial cross-vein present.

Female.—Length 5 mm.; wing 6.4 mm.

Rostrum brownish yellow; palpi brown. Antennae dark brown throughout; fusion segment composed of the first five flagellar segments; remaining nine flagellar segments elongate-oval. Head clear, light gray.

Thoracic dorsum reddish with a very sparse whitish bloom; stripes indistinct; a small group of long, black bristles on each side of the pronotal scutum, mesonotal praescutum with a row of similar bristles on each side of the broad median area; scutellum more yellowish. Pleura yellow, with a sparse, bluish bloom on the mesopleurites. Halteres pale, the knobs a little darker. Legs with the coxae and trochanters light yellow; femora light brown, a little brighter basally, tibiae and metatarsi light brown; remainder of tarsi dark brownish black. Wings grayish subhyaline; veins dark brown. Venation: *Sc*₁ elongate, ending just beyond the radial cross-vein; *Sc*₂ removed from the tip of *Sc*₁ to a distance about equal to the basal deflection of *Cu*₁; *Rs* elongate, arcuated; *R*₂₊₃ moderate, a little longer than cell 1st *M*₂; cross-vein *r* present; basal deflection of *R*₄₊₅ short; cross-vein *r-m* long, arcuated, cell 1st *M*₂ elongate, pentagonal; cell *M* very deep, a little longer than its petiole; basal deflection of *Cu*₁ just before the middle of cell 1st *M*₂; second anal vein very elongate, subsinuate, ending about opposite the middle of the long sector.

Abdominal tergites brown; sternites light yellow; valves of the ovipositor elongate, strongly upcurved.

Habitat.—Oregon.

Holotype, ♀, Mt. Angel, Oregon (F. Epper).

Type in the collection of the United States National Museum.

This interesting crane-fly is the first described, New World representative of the genus. It agrees closely with the genotype, *C. limnophiloides* Bergroth of northern Europe, differing in the more reddish body coloration and in certain venational features, especially in the retention of the radial cross-vein.

Tribe *Pedicini*.Genus *Tricyphona* Zetterstedt.***Tricyphona autumnalis*, sp. n.**

Allied to *T. calcar* O. S.; female with the wings semi-atrophied and the valves of the ovipositor straight; male with the hypopygium provided with conspicuous long hairs.

Male.—Length 13.5–15 mm.; wing 13.5–14 mm.

Female.—Length 20 mm.; wing 9.6 mm.

Male.—Rostrum dull yellow, the palpi dark brown. Antennæ with the scapal segments dull, brownish yellow, the five or six basal segments of the flagellum yellowish, thence passing into dark brown at the tip of the organ. Head light gray, indistinctly darker medially, the frontal tubercle blackish; vertex with long yellowish hairs inserted in black punctures.

Mesonotal præscutum yellowish with three indistinct, reddish yellow stripes; scutellum and postnotum whitish yellow. Pleura whitish yellow. Halteres yellow, the knobs brown. Legs with the coxæ and trochanters light yellow; femora yellow, passing into brownish at the tips; tibiæ yellow, narrowly dark brown at the tips; tarsi dark brown. Wings yellowish subhyaline, the costal region more saturate yellow; stigma brown; veins brown. Venation: vein *R* ₄₊₅ forked, the petiole very short, subequal to the *r-m* cross-vein.

Abdominal tergites dark brown, a little paler caudally; basal sternites yellowish, terminal sternites brown, the segments narrowly ringed with paler on the caudal margins. Hypopygium with the pleurites and appendages dark brown, densely long-hairy.

Female.—Similar to the ♂ but the antennæ shorter; wings relatively very small, semi-atrophied; femora and tibiæ with the dark apices less distinct; valves of the ovipositor powerful, almost straight.

Habitat.—Northeastern United States and Eastern Canada.

Holotype, ♂, Woodworth's Lake, Fulton Co., New York; altitude 1,600 feet; September 2, 1916 (Alexander).

Allotype, ♀, with the type.

Paratopotypes, 25 ♂ ♀; *paratypes*, ♂, Meach Lake, Quebec, Sept. 2, 1903 (Jas. Fletcher); ♂, Rostrevor, Quebec, Sept. 2, 1907 (A. Gibson); ♂ ♀, Katahdin, Piscataquis Co., Maine, Aug. 22,

1913 (Alexander); ♂, Orono, Penobscot Co., Maine, Aug. 14, 1913 (Alexander); ♀, Roque Bluff, Washington Co., Maine, Aug. 13, 1913 (Morse); ♂ ♀, Ellsworth, Hancock Co., Maine, Aug. 3 to 21, 1913 (Stanwood); ♂ ♀, South Portland, Maine, Sept. 4, 1913 (Alexander); Dug Mt., Hamilton Co., N. Y., Aug. 8, 1912 (Young); Mt. Pinnacle, Fulton Co., N. Y., Aug. 5, 1913 (Alexander); ♂, North Fairhaven, Cayuga Co., N. Y., Sept. 12, 1914 (Alexander); ♂, Grand Island, Erie Co., N. Y., Sept. 6, 1909 (M. C. Van Duzee).

(To be continued.)

BOOK REVIEWS.

BIOLOGIA CENTRALI-AMERICANA. Insecta, Lepidoptera—Heterocera, Vol. IV, Tineina, Pterophorina, Orneodina and Pyralidina and Hepialina (part). By the Right Hon. Lord Walsingham, 1909–1915, London.

Volume IV of the *Biologia Centrali-Americana*, by Lord Walsingham, a most important contribution to our knowledge of the Micro-lepidoptera, has, up to the present time, not been reviewed by any of the entomological journals of the United States or of Canada. This is probably due, not to a failure to appreciate it at its true value, but to the fact that Mr. August Busck, the one best fitted to make the review, of American micro-lepidopterists, assisted in the work of its preparation. The present writer does not intend this to be taken in the sense of a review, but rather as a note of congratulation which may call more general attention to the successful completion of this great work, in which the micro-lepidopterist is more especially interested.

The volume comprises an exhaustive study of the *Tineina*, *Pterophorina* and *Orneodina* of Central America, and includes also a few species of *Pyralidina* and *Hepialina*, as additions to the list given by Mr. H. Druce, in vols. I and II of the *Biologia Centrali-Americana*.

There are listed 1,025 species, 225 genera and 27 families, of which 586 species, 54 genera and 2 families are described as new.

In the majority of instances descriptions of new genera are accompanied by cuts, from drawings made by Mr. J. H. Durrant,

showing the head in profile, and the neuration of both wings. Ten excellent plates in colour are given portraying 350 species.

The collaboration of three specialists of such recognized standing as Lord Walsingham, Mr. J. H. Durrant, his assistant, and of Mr. August Busck, has resulted in a valuable production which commands careful and respectful consideration.

The conclusion that secondary sexual characters should be discarded, as a means for delimiting genera, while not a new one, as stated by the author, has not won the universal approval that should be accorded it. Lord Walsingham is, therefore, to be congratulated on having been the first to apply this principle in such a comprehensive manner. A list of genera in which these characters are eliminated as a means of generic classification has, of course, led to the sinking of a number of old and well established names as synonyms. Under *Eucosma* Hb., for example, are placed such familiar names as *Epiblema* Hb., *Epinotia* Hb., and *Thiodia* Hb.

The bibliographical work has been done most thoroughly and will make this work indispensable to all who specialize within the groups treated.

Attention is called, by the author, to the necessity for more careful work in the description of neuration, and to the fact that it is necessary, in most cases, to denude the wing and study it under the microscope. This is undoubtedly true and too much reliance should not be placed upon descriptions based upon older and more inadequate methods. The writer wishes to call particular attention to the helpfulness of the many drawings illustrating the text, and regrets that it was not possible to carry out this plan of illustration for every genus described as new. An adequate verbal description of the neuration of a new genus, for example, is doubtless possible, but doubtless also it is seldom, if ever, given.

The writer is informed that, by an unusually thoughtful arrangement, drawings of unique types were placed, where specimens of the insects were lacking, with either the British or the United States Museum. This feature has added greatly to the usefulness of the book itself and of the collections of the two museums mentioned.

Lord Walsingham has surely won the thanks of all students of micro-lepidoptera, and especially of those on this side of the Atlantic, for his great and helpful contribution.

CHAS. R. ELY.

CHECK LIST OF THE HEMIPTERA (EXCEPTING THE APHIDIDÆ, ALEURODIDÆ AND COCCIDÆ) OF AMERICA, NORTH OF MEXICO.
By Edward P. Van Duzee. N. Y., New York Entomological Society, 1916.

All Hemipterists will welcome the appearance of Dr. Van Duzee's Check List of North American Hemiptera, as it gives them, at last, a complete list of the species of this order (with the exception of the three families mentioned) found within the territory indicated in the title, and includes their systematic arrangement, full synonymy, the date of each name and roughly the distribution of each species.

Dr. Van Duzee has followed the lines of the Oshanin Katalog of Palearctic Hemiptera, and has included the results of the latest and best systematic studies dealing with this order. The list begins with the family Scutelleridæ and follows, in reverse order, the system published by Reuter.

The rule of priority has been followed throughout the work, and the synonymy includes that of all the higher group names as well as that of the genera and species. Different types are used for the various grades of group names, the generic and specific appearing in bold-faced type, and the synonyms in italics.

The list gives the names of 698 genera and 2,945 species, and concludes with an index to the generic and higher group names, a feature which greatly facilitates its use.

Dr. Van Duzee is to be highly congratulated on the completion of his invaluable work, and students of Hemiptera and of general and applied entomology will all feel deeply indebted to him and will await with great interest the appearance of the fuller and more complete bibliographical and synonymical catalogue of the Hemiptera, which will be published in the near future.

G. A. M.

THE SARCOPHAGIDÆ OF NORTH AMERICA. *Sarcophaga and Allies in North America*. By J. M. Aldrich. Memoir of the Thomas Say Foundation of the Entomological Society of America. Lafayette, Ind., 302 pp., 16 pls. (Published November 30, 1916.)

This attractive volume constitutes the first Memoir of the Thomas Say Foundation of the Entomological Society of America, and it is peculiarly appropriate that it should be the work of the Editor of the Foundation. At the Columbus meeting of the Entomological Society of America in December, 1915, a standing committee was established under the name of "The Thomas Say Foundation," the purpose of which is "for the publication of works of a monographic or bibliographic character on the insects of North America." The establishment of this Foundation is the outcome of a proposal made to the Society in 1913 by Mr. Nathan Banks. As its success must depend on the financial assistance it receives from those interested in its publications, it is to be hoped that generous support will be forthcoming from all who desire to assist in the production of a series of monographs on American entomology somewhat similar to the well-known monographs of the Ray Society.

Dr. Aldrich could not have selected a more desirable group for monographic treatment than the Sarcophagidæ. Entomologists have been confronted for some time with the almost hopeless task of identifying the species of this group of flies, the discovery of whose diverse habits has demonstrated how important they are from biological and economic standpoints. The flies are larviparous and the habitats of the larvæ range from decomposing animal substances and excrement, to the bodies of warm-blooded vertebrates. They appear to show an interesting transition from the habit of devouring dead insects to parasitism upon living ones.

Only those who have endeavored to identify the species of *Sarcophaga* will appreciate the difficulty of using the old descriptions, and Dr. Aldrich (and with his work we would couple the excellent work of Dr. R. R. Parker in the same group) has endeavored

to raise what he rightly calls the "virtual blockade" in this group. The chief object of the author has been to make the species recognizable and their determination as easy as possible. To this end he has subordinated the desire so frequently prevalent among certain systematists to create a large number of genera. Had he not been conservative in this respect there is little doubt that no one but the author would have been able to recognize the genera. The author's remarks on this aspect of the subject will find much sympathy among working entomologists. He says: "A survey of the present status of the Muscoid Diptera indicates unmistakably that our great need is not more genera, but a more complete knowledge of species. The tendency of extreme generic specialization is to erect about itself impenetrable barriers of names, as is well illustrated by Desvoidy and Bauer. Genera conceived in this mental atmosphere are likely to be almost wholly subjective creations, which make no impression on the minds of others. The argument that the classification must express the relations has its dangers, partly from the subjective elements involved, and partly from the fact that the classification has also another important function—to provide us with names for our species, which should be as stable as possible if they are to have any usefulness. Furthermore, to separate a species from the genus in which it has been located expresses one relation, that of difference; but it obscures another, that of resemblance, which may be more important. One of the main objects of the present work is to make the identification of species as simple and certain as possible, and thus to attract biological and economic workers to the group. This object would inevitably be defeated by the erection of a considerable number of separated genera. These are the governing considerations which have prompted the preservation as nearly as practicable of the old genus *Sarcophaga*."

The species are separated on the characters of the genitalia which method of separation in this group was first employed by Parker in his study of the Sarcophagidæ of New England. The taxonomic value of the genitalia in different groups of insects, such as Diptera, Coleoptera, Lepidoptera and Mallophaga, is now being clearly demonstrated by different workers, and a valuable and

comparatively simple means of identification is thus being put into the hands of working entomologists.

In this monograph one hundred and forty-five species and varieties belonging to sixteen genera are described. Excellent figures are given of the genitalia in one hundred and thirty-eight cases. The species can be readily divided into eight groups by not restricting the separation to generic characters but by using the most salient and easily recognizable characters that can be found. In a large number of cases the female has not been described, and the author rightly admits the possibility of errors occurring through the identification of females with the wrong males, as few pairs collected *in copula* exist in the collections he has examined, which collections, by the way, include the chief collections of Sarcophagidæ on this continent.

Ninety-five new species are described and several new varieties. Five of these new species and one new variety occur in Canada.

When we remember that in the author's Catalogue of North American Diptera, one hundred and six nominal species of Sarcophaga were listed and that hardly more than half a dozen of these had been described in a manner that would permit recognition, the extent of our indebtedness to him for this contribution will be readily appreciated. He has placed both systematists and economic workers under a debt of gratitude for his painstaking work which will undoubtedly stimulate others to study this group of flies, the investigation of whose habits is rapidly disclosing the economic importance of the group.

We cannot conclude this review without remarking on the excellent manner in which the monograph is printed and bound, and we hope that this standard will be maintained in future volumes of this series. It is unfortunate that in the author's desire to make the work immediately available, a number of typographical errors have been overlooked, and we think that the inclusion of an outline sketch of *Sarcophaga* would have added to the value of the introductory description.

C. GORDON HEWITT.

Mailed January 24th, 1917.



EDMUND BAYNES REED.

Original member of the Entomological Society of Ontario, 1863-1916.

The Canadian Entomologist.

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No. 2

EDMUND BAYNES REED.

Few of the present members of the Entomological Society of Ontario have any knowledge of the pioneer work which was done more than half a century ago by a small band of enthusiastic entomologists. Very few of those who joined in its organization on the 16th of April, 1863, survived to witness its Jubilee three years ago; among these were Mr. Edmund Baynes Reed, and now he has in his turn been removed by death after a long illness due to heart trouble. He died at Victoria, B.C., on Saturday, November 18th, in the 79th year of his age.

Mr. Reed came to Canada from England when a young man and settled in London, Ontario, where for some years he practiced his profession as a lawyer. The kind of work it entailed was not very congenial to him, and was consequently abandoned.

As a devoted member of the Church of England, he took a keen and active interest in its concerns, and became Secretary-Treasurer of the Synod of the Diocese of Huron—a position which he continued to hold until his removal to British Columbia in the year 1890.

From his boyhood days in England he was devoted to Natural History, and especially to the collection and study of insects. To these pursuits he devoted most of his leisure hours, and when the Society was formed he became one of its most energetic and useful members. To him was chiefly due the establishment of the library which is now one of the most valuable of the kind in the Dominion. In co-operation with Dr. William Saunders he was instrumental in forming the London Branch of the Society, which grew and flourished for several years and was finally absorbed by the parent Society when its headquarters were removed to London. When it was decided to send a representative collection of Canadian insects to the Centennial Exhibition in Philadelphia in 1876, Mr. Reed devoted all his spare time during many months to its prepara-

tion and contributed the whole of his collections. He was Secretary-Treasurer of the Society in 1871 to 1873 and from 1880 to 1886; member of the Council from 1874 to 1876; Vice-President in 1874, 1877 and from 1887 to 1889; and during most of these years Curator and Librarian as well.

The following extract from the report of the Council for the year ending August 31st, 1890, is a well-merited appreciation of the many services that he rendered to the Society: "The Council desire to place on record their feelings of deep regret at the removal of Mr. Reed from this Province and the loss which the Society thereby sustains. Mr. Reed is one of the original members of this Society, and for more than a quarter of a century has been one of the most active and zealous of its officials, filling at different times the positions of Vice-President, Secretary-Treasurer, Librarian, Curator and Auditor. To him it is especially due that the Library has grown to its present dimensions and value, and that so much progress has been made by the Society in many directions. The Council beg to thank Mr. Reed for his services in the past, and wish him all possible success and prosperity in his new and important sphere of labour."

When the Society was called upon in 1870 to make its first Annual Report on insects in relation to agriculture and fruit-growing, Mr. Reed joined with Dr. Saunders and Dr. Bethune and contributed the article on "Insects affecting the Plum;" a further article in continuation of the same subject was published in the Second Report, and also papers on "Insects injurious to the Potato," and "Insects attacking the Cucumber, Melon, Pumpkin and Squash." His further contributions to the annual reports were "Insects affecting Maple Trees," "Insects affecting the Peach," and addendum to the "Insects injurious to the Potato" (3rd Report, 1872); "On some common insects which affect the Horse, the Ox and the Sheep" (4th Report, 1873); "Entomological Contributions: The Io Moth, the Flat-headed Apple-tree Borer and the Locust-tree Borer" (5th Report, 1874); "Sphingidæ—Hawk-moths" (12th Report, 1881); "Diptera—Two-winged Flies" (13th Report, 1882); and a number of short notes in several of the volumes. He also prepared a useful Index to the first thirteen Reports 1870-1882, a pamphlet of 35 pages.

Mr. Reed was also a constant contributor to the Canadian Entomologist. His articles related chiefly to the Lepidoptera and included descriptions of larvæ, records of rare captures, collecting notes, and popular papers on various common insects. He was equally interested in both systematic and economic Entomology.

Though specially devoted to the study of insects, he was for many years engaged as an amateur in taking meteorological observations. In co-operation with the Observatory at Toronto, he installed the necessary apparatus, using the tower of the Cathedral for his anemometer and vanes, and connecting them with his house which was near by. His records were so accurate and satisfactory that he was selected to take charge of a newly-established Observatory at Victoria, British Columbia, to which place he removed in 1890 and there remained for six and twenty years—respected by all who came in contact with him and beloved by his friends.

During Mr. Reed's residence in London the writer had the pleasure of intimate friendship with him, and often enjoyed his hospitality when attending the Annual Meetings of the Society. He was always an agreeable and sympathetic companion, merry and vivacious, cheerful and happy hearted. Since his removal to the distant Pacific Coast, the friendship has been maintained by correspondence in default of ever meeting; his last letters related to the celebration of the Society's Jubilee, in which he was deeply interested.

C. J. S. BETHUNE.

POPULAR AND PRACTICAL ENTOMOLOGY.

ON THE PORTRAIT OF A WOLF SPIDER.

BY CHARLES MACNAMARA, ARNPRIOR, ONTARIO.

The number of species of insects and their allies in the world is a frequent subject of discussion among entomologists, and it may be remarked that writers differ a good deal on the question. But I have never come across any attempt at a general insect census. Doubtless the numbers are too appalling, and the would-be enumerator must shrink aghast before the frightful superabundance of invertebrate life. To count the stars of the Milky Way would be

easy compared with numbering these little creatures. If the task were attempted, the ordinary units of our decimal notation would be found useless, and our only hope would be to adopt some vast measure like the "light-years" of the astronomer. But if we cannot even guess at the number of individuals in these lower forms of life, we may at least form some rough estimate of the *relative* abundance of the various orders and like divisions.

But here again there are likely to be decided differences of opinion. There is such a tremendous flow and ebb in the tide of "insect" life—using the term in its wide, popular significance—that it is not easy to infer which kind is really in the majority. Speaking of conditions in this country, the student of pond-life must be persuaded that at certain times of year there are more *Daphnia* and *Cyclops* and other minute crustaceans in his pools than any other form of *Arthropoda* in the district. Again sometimes lepidopterous larvæ, such as the tent-caterpillar and the army-worm, seem to outnumber all other insects. May-flies and grasshoppers also appear on occasion in immense numbers. The minute springtail, too, must not be forgotten, for certain species of this family sometimes emerge in winter in such abundance as to blacken the snow over considerable areas. Mosquitoes are quite as plentiful as anyone could desire, but we are perhaps apt to overestimate their importance in the numerical scale on account of their obtrusive manners which force them unduly on our attention, and the same is true of the house-fly. But I was long convinced that ants must hold the record for numbers of individuals, for anyone who has collected them must have been struck by their wide distribution and their great abundance. They are to be found simply everywhere: in dense woods, mossy swamps, dry, open fields, rocky hills, and hot, sandy beaches. The sacred dwelling of man himself is seldom exempt. One or other species of the *Formicidæ* adapts itself to these most varied habitats, and flourishes in all.

However, I recently changed my opinion on this point. In the course of a forty-mile drive on the first of October last through parts of the counties of Renfrew, Lanark and Carleton in Ontario, I was fairly astounded at the evidence of the numbers of spiders there must be in the country. Our road lay mostly through culti-

vated land, and everywhere over the tens of thousands of acres we passed were laid the gossamer threads of spiders, so thickly set that I doubt if one could have placed as much as a finger tip anywhere in the fields without touching several strands of the webs. Every tall weed and every fence streamed with the threads, and towards evening the rays of the westering sun were reflected from the shimmering fields like moonlight on a lake. All this was the work of so-called gossamer spiders, formerly thought to be a distinct kind but now known to include the young of many different species. The number of individuals necessary to produce the wonderful effect must have been stupendous indeed, for our drive did not circumscribe the area thus affected, and no doubt the same condition obtained for many miles around our course.

Spiders are always connected in the popular mind with the spinning of webs and snares to catch the unwary fly, but a great many species resort to no such subterfuge. Of course, all true spiders can spin, but many use their silk only for the manufacture of egg-bags or to line their burrows, or as a life-line by which they can drop from danger or save themselves from a fall. Chief among those that spin no web may be mentioned the Attids or Jumping Spiders which leap on their victims unawares; the Thomisids or Crab Spiders that lie in wait in flowers to seize insects that come in search of nectar; and the Lycosids or Wolf Spiders, exceedingly active runners, that hunt down their quarry in much the same manner as their mammal namesakes. Of these three families the Wolf Spiders are by far the commonest, and are found everywhere in great variety. The original of the accompanying "portrait" belonged to a rather small-sized species numerous inhabiting a sandy beach on the shores of the Ottawa River near Arnprior. The claw terminating the palp shows this specimen to be a female, for the palps of male spiders end in a curious knob-like organ. This species, which is a typically swift runner, is thickly clothed with very fine, light brown hair, with darker markings—it might almost be called a "fur"—a coloration well calculated to conceal it in its sandy habitat. Indeed, I seldom saw one of these spiders on my frequent visits to this spot during the summer, but one day in the late autumn I noticed the surface of the beach dotted with scores of tiny heaps of fresh, damp sand. On investiga-

tion each of these was found to close the mouth of a vertical tunnel twelve to eighteen inches deep, at the bottom of which was a torpid spider of this species, evidently retired for the winter. Obviously the spider population of the beach was much greater than I had suspected.

Keeness of vision is as necessary to the wolf spider as agile limbs, and so it is well provided with eyes, which are, too, much better developed than those of the snare weavers that depend largely on their sense of touch to acquaint them of the approach of their prey. Apparently the "Wolf" can see in every direction, above, before and behind. On the front of its head a row of four small eyes surmounted by two larger ones inform it of happenings before it and to either side, while two other large eyes on the top of the head are directed upwards and backwards. The powerful jaws, armed with a pair of needle-sharp fangs, each grooved with a poison duct, are almost hidden by the long hair covering them. She has indeed a repulsive countenance. We are often told of the beauties revealed by the microscope. In this case it is a horror that has been disclosed. But the race is not always to the swift nor the battle to the strong, for with all her panoply, this redoubtable spider was overcome by an antagonist more terrible yet, as I will relate.

One day in early September when seated on a log at my favorite beach, and taking a quiet entomological survey of the surroundings. I suddenly caught sight of an extraordinary many-legged insect buzzing rapidly across the sand towards me. A second glance resolved the anomaly into a digger wasp dragging with it a wolf spider which it had paralyzed with its envenomed sting, and was carrying to its nest to provide fresh food for its future larvæ. The wasp's shallow, sloping tunnel was in the sand close to my feet, and she quickly pulled her prey within. I waited some time in vain for her to emerge, and then dug up the nest. The wasp escaped with a whirr of wings but the wretched spider, although alive, was incapable of movement of any kind, and remained inert in my hand. Commiserating a spider caught at its own rapacious game is something like wasting pity on the incinerated crew of a baby-killing Zeppelin, but I could not help feeling sorry for this erstwhile lightning runner of the sands doomed never to move its swift limbs

again. Here, however, was an excellent and unusual opportunity to secure a photograph of a wolf spider. For the living, uninjured Lycosid is so nimble and nervous that it is a most difficult matter to photograph it successfully, while it is very hard to "set up" the dead spider properly. So I carefully carried my spider home.

Here a few concise, technical notes may be of interest to the photomicrographer. The negative of the accompanying photograph was made with an ordinary whole plate view-camera provided with both front and back focussing. A half plate or even quarter plate camera would have served equally well or better, but no smaller instrument of sufficient extension was available. The lens used was an Aldis photomicrographic anastigmat of 2 in. focus, an admirable little lens of moderate price that can easily hold its own with much more expensive objectives. My camera and object stand is a home adaptation of the swinging frame of the photo-engraver. It consists of a board 4 ft. long by 14 ins. wide swung by cotton ropes at the four corners from two light trestles about 3 ft. high, and is a device I find very useful to avoid vibrations during long exposures.

At one end of the board is a narrow, longitudinal slot, one foot long, through which a bolt with a wing nut fastens the camera firmly at any position along the slot. As the object must be placed very close to a lens of such short focus, if the latter is mounted in a lens board in the ordinary way, the shadow cast by the relatively large camera front is sure to cause trouble. To obviate this I have the lens mounted at the truncated apex of a copper cone, 3 ins. long, the base of which, $2\frac{1}{2}$ ins. in diameter, screws into a lens flange attached to the usual lens board which fits the camera front. A stand was made for the spider with several small blocks of wood, about 8 in. x 3 in. x 1 in. thick, piled up like steps of stairs. On these, by means of dark-room pins, was fastened a curved piece of smooth, white paper, with its top sloping away from the lens. The middle of the curve formed a little shelf just opposite the lens, and on this the spider was placed. This arrangement offered a plain background, and a shadowless support on which the spider was carefully posed, her limbs and palps being put in position with a couple of botanical needles.

The illumination used was daylight, the whole apparatus having been set up in a large bay window looking north. A camera extension of 18 inches was employed, which, with the 2-inch lens, gave an image enlargement of 8 diameters. The ground glass of the camera is provided with a clear spot in the centre, and on this the image was critically focussed with the aid of a focussing magnifier. The lens was stopped down to f.45 to gain the necessary depth of field, and the required exposure was calculated with a Watkins exposure meter, the normal time, as shown by the meter, being multiplied by the square of the magnification, in this case 64.

The plate was a Wratten & Wainwright backed panchromatic, but as it was used without a screen, any good ortho plate would have given much the same result. It is customary in photographic data to mention the developer, but for ordinary negative work there is no essential difference between the many developers on the market, and one should always use the solution one is accustomed to. Personally, I admit a preference for the well known "B. J." pyro-soda, and with this the spider negatives were developed. Several exposures were made of different views of the spider, and thanks to the excellent lens and small stop, all the negatives turned out so sharp and with such good depth of focus that they can be enlarged to any reasonable size. In fact I have enlarged the "portrait" to 75 diameters, and only stopped at that size for want of a larger sheet of bromide paper. The image would not be unduly soft at 150 or 200 diameters.

The spider proved a most amenable sitter, and would remain motionless for an indefinite time in any position she was put in. But if the poison of the wasp had fettered her limbs, it had not tamed her ferocious spirit, for I can read a felonious glare in those nightmare eyes.

After photographing her, I kept her under observation in a pill box to see if the effects of the wasp's sting would wear off. After about a week the paralysis seemed to be passing, and she began to make a few constrained movements. I hoped, if she recovered, to set her free once more on her native beach. But who can escape his fate? The very steps we take to avoid our destiny lead us irresistibly towards it. This spider's doom was to be eaten alive by a wasp larva, and it found her even in the pill box; my



PORTRAIT OF A WOLF SPIDER.

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intervention availed nothing. One day I opened the box as usual, and to my surprise found therein a small voracious grub which had already devoured about half of the hapless Lycosid. I had carried none of the wasp's nest material from the beach with the spider, and although I am told that these wasps are not known to attach the egg to the food supply, I can only suppose that in this case the egg was in some way fastened to the victim, and when it hatched out the grub began work at once on the food supply provided by the marvellous instinct of its mother. Next day there remained only the scattered legs of the spider, and a couple of days later, the grub itself, pining for the "optimum" conditions of its sandy nest, died also.

INSECTS IN OCEAN DRIFT.*

I. HEMIPTERA HETEROPTERA.

BY H. M. PARSHLEY, BUSSEY INSTITUTION, HARVARD UNIVERSITY.

Insects cast up by the waves are often found on the shores of bodies of fresh and salt water, as is well known to most collectors. Specimens found in this way are usually few and scattering, and their presence in the water is probably due simply to an unusually venturesome flight which may have carried them too far for a safe return to land. On rare occasions, however, much more extensive flights may occur, with the result that the shipwrecked are cast ashore in unbelievable numbers, sometimes forming a windrow for miles along the beach. This phenomenon is not to be explained in connection with the spring and fall flights when the air seems alive with insects on the wing, as it has been observed at various other seasons, and for the same and other reasons such flights do not appear to be nuptial in character. Sometimes a violent offshore wind has been held accountable for the presence of the insects in the water, but this explanation will not fit the cases which I have observed; in fact, no satisfactory hypothesis has been advanced as yet. As a knowledge of the species concerned is important in the explanation of insect activity, I append a list of the Hemiptera Heteroptera which I have taken in ocean drift, leaving the list of the other groups for a later paper.

* Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 123.

For several years I have spent the summer at Beach Bluff, Mass., during which time I have seen the phenomenon under discussion on only three occasions, each time in the afternoon: June 21, 1915, July 18, 1915, and Aug. 1, 1916. In each case there was a light on-shore breeze with fair weather, and in none was the occurrence preceded by an unusually violent off-shore wind, though on the day before the last a moderate land breeze was observed. The insects were not washed up in such enormous numbers as in the cases reported by Needham,* where the shore was blackened by them for miles, but nevertheless the stranded insects were very numerous, in some places forming a continuous line along the beach. The occurrences which I observed were remarkable for the large number of different species represented, with relatively few specimens of each, unlike some of the previously reported cases where the flotsam consisted largely of a single species in enormous numbers. As noted by J. R. de la Torre Bueno in his paper on the subject,† the collector finds in beach drift many species whose retiring habits ordinarily save them from capture, and in the following list are a number whose presence in the vicinity I had not suspected. All the specimens recorded below were taken from the sand immediately on being left by the waves, and I can thus vouch for the fact that all actually took part in the flights over the water. Those marked with an asterisk are mentioned in the list of ocean drift Hemiptera given by Bueno.

LIST OF SPECIES.

Scutelleridæ.

Eurygaster alternata Say, July 4, 1915.

Cydnidæ.

Thyreocoris ater A. & S., June 21, July 18. (2)

T. nitiduloides Wolff., June 21.

T. pulicarius Germ., June 21, July 18. (6)

Pentatomidæ.

**Podops cinctipes* Say, June 21.

**Mormidea lugens* Fab., June 21, July 18. (2)

Dendrocoris humeralis Uhl., July 18.

* Insect Drift on the Shore of Lake Michigan, Occas. Mem. Chicago Ent. Soc., vol. 1, No. 1, 1900.

Beetle Drift on Lake Michigan, Can. Ent., vol. 36, 1904, p. 294.

† Heteroptera in Beach Drift, Ent. News, vol. 26, 1915, p. 274.

Perillus exaptus Say, June 21.

**Apateticus cynicus* Say, July 18.

**A. bracteatus* Fh., Aug 1.

Lygaeidæ.

**Lygæus kalmii* Stal., July 18.

Ortholomus longiceps Stal., July 18.

**Nysius ericæ* Schill., June 21.

**Ischnorrhynchus geminatus* Say, Aug. 1.

Cymus angustatus Stal., July 18.

C. discors Horv., June 21.

Geocoris bullatus Say, June 21. (6)

G. bullatus discopterus Stal., June 21. (2)

G. uliginosus speculator Mont., July 18. (3)

G. uliginosus limbatus Stal., June 21. (4)

**Ligyrocoris diffusus* Uhl., June 21, Aug. 1. (10)

Rhyparochromus plenus Dist., July 18, Aug 1..

These specimens seem to agree with the description and figure given by Distant in the *Biologia Centrali-Americana* of a form from Guatemala, but there is some question in regard to the generic reference. I have seen a specimen from Mt. Tom, Mass., and others have been found at Georgetown, Conn., and in the Huachuca Mts. Ariz. For most of this information I am indebted to Mr. H. G. Barber, who spares neither time nor trouble when called upon for assistance in some difficult question relating to the Hemiptera.

**Eremocoris ferus* Say, June 21, July 18. (11)

Piesmidæ.

Piesma cinerea Say, June 21.

Not found heretofore north of Rhode Island.

Tingidæ.

Corythucha marmorata Uhl., July 18.

C. sp. nov., June 21.

The description of this and several other new species of *Corythucha* will be published elsewhere.

C. cratægi Morrill, Osb. & Drk., Aug. 1.

Melanorhopala obscura Parsh., (*Psyche*, Vol. 23. 1916, p. 167) June 21.

Nabidæ.

**Nabis ferus* Linn., July 18.

Miridæ.

Miris dolabratus Linn., June 21. (2)

Platytyrellus sp.?, June 21.

Neurocolpus nubilus Say, Aug. 1.

Pæcilocapsus lineatus Fab., July 18.

Capsus ater Linn., June 21. (4)

C. ater semiflavus Linn., June 21.

Camptobrochis grandis Uhl., July 18. (7)

Gerridæ.

**Gerris marginatus* Say, July 18. (4)

Saldidæ.

Saldula major Prov.

S. pallipes Fab., July 18. (2)

S. sphacelata Uhl., June 21.

S. opacula Zett., July 18.

S. sp.?, June 21, Aug. 1. (3)

**Micracanthia humilis* Say, June 21, Aug. 1. (9)

Some of these were taken under seaweed where they were very numerous on Aug. 1, though not so ordinarily. Stranded specimens were very active as soon as they left the water, and probably those under the seaweed had taken temporary refuge there after escaping the waves.

Corixidæ.

Corixa verticalis Fieb., July 18. (2)

Kindly identified by Prof. J. F. Abbott.

It is well known that some insects can withstand prolonged submergence in salt water, but from the condition of the more fragile species, many of which gained the shore alive, it seems to me probable that the flights occurred on the same day, shortly before the insects were washed ashore. If this be true, a possible explanation of the flights presents itself. On a clear day with a light, on-shore breeze the surface of the ocean reflects the sunlight with a peculiar sparkling brilliancy which might conceivably attract insects already flying above the land in unusual numbers because of some favouring combination of atmospheric conditions. The absence of the latter factor would account for the lack of a flight on days which were otherwise favourable. Thus, a light, on-shore breeze rather than a strong, off-shore wind may be the more frequent cause of the flight of insects over the water, and their consequent presence in the drift.

THE CALIFORNIA SPECIES OF MYZUS, WITH THE
DESCRIPTION OF A NEW SPECIES.

BY G. O. SHINJI, BERKELEY, CALIFORNIA.

The following species of *Myzus* have been collected by the writer in the vicinity of the University of California during 1915.

1. *M. cerasi* (Fabr.). Taken from curled leaves of cultivated cherry (*Prunus cerasus*) within sixty feet of the University of California campus.

2. *M. circumflexum* Buckton. Found on following plants: *Vinca major*, *Solanum tuberosum*, pansy, *Ceanothus* sp., *Stachys bullata*, *Plantago* sp., *Senecio nickanioides*, *Solanum nigrum*, *Fuchsia* sp., wall flower (*Cheiranthus cheeri*), lilies, iris, gladiolus, *Nasturtium* sp., water cress, foxtail, *Cerastium viscosum*, buck-eye (*Æsculus californica*), *Sisymbrium* sp., *Viola* sp., *Symphoricarpos racemosus*, Boston ivy, *Digitalis*.

3. *M. rosarum* Walk. Taken on wild and cultivated roses.

4. *M. rhamni* Boyer. Taken from leaves, stems and berries of California coffee-berry tree (*Rhamnus californica*) and also *Cascara sagrada*.

5. *M. ribis* (L.). Collected from under side of leaves of wild gooseberry, University of California campus, April 10, 1915.

6. *M.* sp. This species will be named by Professor Essig. Host plant *Aquilegia vulgare* and *A. truncata*. Date of collection, April 20, 1915. Berkeley, and also May 20, 1915, Inverness, Marin County, California.

7. *Myzus godetiae*, n. sp.

Alate viviparous female.—General colour light green. Length of body 1.6 mm. Width of abdomen .7 mm. Wing expansion 3.9 mm. Head broader than long, dusky, eyes dark red. Antennæ arising from prominent frontal tubercles, dusky. Length of antennal joints: III, .5 mm.; IV, .3 mm.; V, .2 mm.; VI, .1 mm.; Spur .4 mm. 10-12 sensoria on III. Prothorax dusky, broader than long, wider than head. Thorax dusky, width .7 mm. Legs with apical two-thirds and one-third of tibia dusky, remaining parts green. Abdomen green with large median dorsal patches or rows and also marginal dots of black. Cornicles dusky to black,

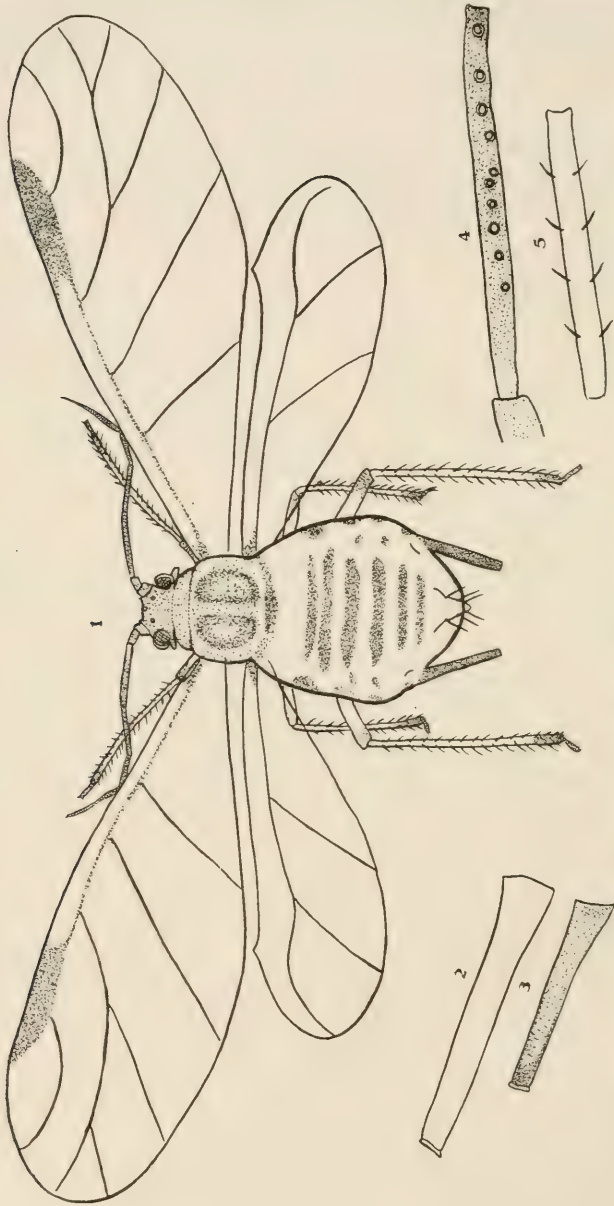


Fig. 4. *Myzus gaidetiae*. 1, alate viviparous female; 2, cornicle of apterous viviparous female; 3, cornicle of alate viviparous female; 4, second and third antennal articles of alate viviparous female; 5, same of apterous viviparous individual.

.4 mm. long, decidedly tapering toward the distal end. Style somewhat conical, slightly dusky.

Apterous viviparous female.—General colour green. Length of body 1.6 mm. Width of abdomen .7 mm. Head green, broader than long. Eyes dark red. Antennæ situated on frontal tubercles, green with sixth including filament and also apical half of fifth, dusky. Rostrum beyond second coxa, tip dusky. Thorax and abdomen green. Legs green, with apices of tibia and tarsal joints dusky. Cornicles green, slightly swollen near apex, .5 mm. long. Cauda green, conical.

Host plant.—*Godetia amæna* (Lehn.). Lilja?

Locality.—University of California campus, Berkeley, California.

Date of collection.—April 4, 1915.

A NEW SPECIES OF AMPHROPHORA FROM CALIFORNIA.

BY G. O. SHINJI, BERKELEY, CAL.

Amphrophora cicutæ n. sp.

Alate viviparous female.

Slightly smaller than *A. rubi* Kalt. General colour light green or pale. Length of body 3 mm. Width of abdomen 1.15 mm. Wing expansion 5.4 mm. Head pale, broader than long, width between the eyes .45 mm. Beak reaching second coxa, tip dusky. Antenna situated on prominent frontal tubercles, slightly dusky, more intensely so at the joints and apex of VI and spur. Length of antennal joints: III, 1.1 mm.; IV, .9 mm.; V, .64 mm.; VI, .25 mm.; spur 16 mm.; III with about 18 sensoria in a row. Prothorax with a small tubercle on each side, nearly as wide as head, broader than long, width .6 mm., slightly dusky, especially when viewed from side. Meso- and metathorax slightly dusky. Width of mesothorax .8 mm. Abdomen pale, with small, red spots scattered throughout. Legs moderately long, tarsi and apical portion of tibia dusky, the rest the colour of the body. Cornicles swollen beyond the middle, tip dusky, the rest the colour of the body. Length 1.1 mm. Style pale, .45 mm. long.

Apterous viviparous female.

Light green or pale according to niches. Length of body 2.6–3.4 mm. Width of abdomen 1.2 mm.–1.7 mm. Eyes dark red. Beak reaching third coxa, tips dusky. Antenna situated on frontal tubercles, apices of III, IV, apical half of V and VI including spur dusky, rest pale or green. Head, thorax and abdomen light green or pale. Legs colour of body except tarsi, which are dusky. Cornicles colour of body, swollen beyond middle, length .7–9. mm. Style moderately long, colour of the body.

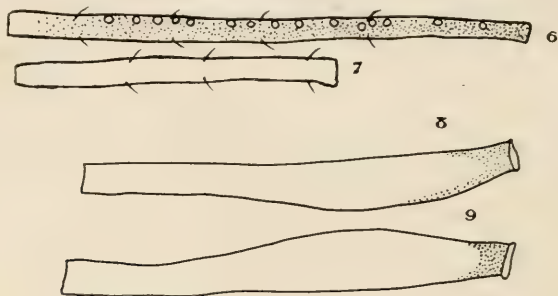


Fig. 5.—*Amphrophora cicuta*.—6, third antennal articles of alate viviparous female; 7, third joint of apterous viviparous form; 8, cornicle of alate, and 9, cornicle of apterous female.

Host plant.—*Cicuta virosa* var. *californica*.

Locality.—University of California campus, Berkeley, California.

Date of collection.—April 20, 1915.

Notes.—This species is nearer to *A. rubi* Kalt. than *A. latysiphum* Davdn. It differs from *A. rubi* in the following characters: (1) Spur with its base longer or at least as long as V plus IV or III plus V. (2) Sensoria on III about one-half as many as in *A. rubi*. (3) III of apterous forms without or with fewer sensoria. (4) Shape, size and coloration of cornicles.

The following numerical data, obtained with the writer's collection of *A. rubi* Kalt. at the same date and locality, may be of use for comparison:

A. rubi Kalt.—Length of antennal joints of alate form: III, 1.2 mm.; IV, .7 mm.; V, .6 mm.; VI, .2 mm.; spur, 1.3 mm. Length of body 3.5 mm. Width of abdomen 1.4 mm. Width of prothorax .7 mm. Sensoria on III 35–45.

Host plants.—Wild and cultivated blackberry.

OBSERVATIONS ON THE LIGHT-EMISSION OF
AMERICAN LAMPYRIDÆ:

THE PHOTOGENIC FUNCTION AS A MATING ADAPTATION; 5th PAPER.

BY F. ALEX. McDERMOTT, WASHINGTON, D.C.

The following paper embraces the results of some observations made since the fourth paper in this series was published. (See Canadian Entomologist, 1910, vol. 42, p. 357; 1911, vol. 43, p. 399; 1912, vol. 44, p. 73; 309.)

1. *Pyractomena borealis* Randall. (*) The presence of this species in the neighbourhood of Washington, D.C., was established by Mr. W. S. Fisher, who found it pupating in large numbers in deep crevices in bark at Great Falls, on the Potomac River, about fifteen miles northwest of the U. S. Capitol at Washington. It is quite a large Lampyrid, and its flash appeared to the writer to be the brightest of any of the known local fireflies. When flying at a height of from eight to ten feet above the ground, its flash produced a distinct though faint illumination over an area perhaps ten feet in diameter on the ground.

The distribution of the luminous organ in this species is very similar to that in *P. angulata* and *P. lucifera*. In the male, the entire ventral surfaces of the two segments before the last show the yellow colour of the luminous tissue, while in the female this tissue area is restricted to two irregular patches on these segments. The male should, therefore, give distinctly the brighter light. The habit of the insects of pupating in crevices in bark several feet from the ground, as observed by Fisher, together with the known reluctance of many female lampyrids to fly, even when possessing wings, would make it seem probable that the females would be found on the bark of the trees where they emerged, or not very far away.

* In a former paper the writer adopted the late E. Olivier's name *Lecontea* for this genus. Olivier's reasons for the change, however, appear to be invalid, according to Rule 36 of the International Commission on Zoological Nomenclature. As a matter of interest it may be mentioned that Mr. H. S. Barber, of the U. S. National Museum, calls my attention to the fact that the name *Pyractomena* was originally applied by Dejean (1833) to a genus containing only manuscript names of species. Leconte, in 1850 applied this generic name to *Lampyrus borealis* Randall, a described species, which therefore automatically became the type for this genus. This publication antedates that usually given, Leconte, 1852. The other species, *lucifera* and *angulata*, are correctly placed in this genus.

The writer's observations on this species were made at Great Falls, over the same area where Fisher had found the species, and on the evening of May 3, 1916, several days after Fisher's observations. The insects did not appear until it was quite dark—about 8.00 p.m.—when numbers of them were seen along the top of the bluff, some forty or fifty feet high, which marks the former river bank at this point. On ascending this bluff, the insects were found to be flying around in the foliage, principally from ten to twenty feet above ground, flashing at intervals of five to ten seconds; they soon became very plentiful. At first their flight appeared to be entirely aimless, and even long and close watching failed to reveal any replies to the flashes from females on bark or twigs, but presently a fainter occasional flash was observed on a trunk about 8 feet above ground, where the brighter flashes of the males had already been observed. It soon appeared that the fainter flash emanated from a point between two males, each of the latter some six or eight inches from the faint flashes. An electric flashlight revealed an imago of this species on the bark, but just out of reach; it cannot be stated positively that this was a female, but the conduct of the faint flashes points strongly in that direction, as the fainter flash was several times observed to follow closely flashes from one of the two males; it did not follow all of these flashes, which may have been due to the irregularities in the bark hiding the flashes of the male at times. The males, as was found later, on alighting near a supposed female, run fairly rapidly over the area, apparently in search of her. In this case, the male lower down on the bark was captured and identified. They were still flying and flashing an hour after the first observation, apparently as thickly as at first, this conduct resembles *Photuris* more than *Photinus*—indeed, except that the light is not quite as green to the writer's eye, the flight of this species suggests that of *Photuris*.

The flash of the male is a single, rather short and intense flash, followed in many instances, though not in all, by a very faint, slow or "trailing" secondary flash. This secondary flash varied greatly with different individuals, being in some cases so distinct as to suggest the double flash of *Photinus consanguineus*, while in other specimens it was apparently absent. The males, when approaching a supposed female, usually, though not always, exhibit a faint,

continuous glow between flashes. The flash of the female—if this may be judged by the specimen seen on bark and assumed to be a female—is a much less intense and slower flash, given almost immediately after the flash of the male she is answering. Representing these in the manner used by the writer in his review of this subject (*Zeitschrift für wissenschaftliche Insektenbiologie*, 1914, Bd. 10, pp. 303-307), the flashes of this species would appear as shown in the sketch, Fig. 1.

Experiments with a pocket flashlight soon showed that the flying males would pay no attention to the unshielded light, when flashed immediately after their flashes (although the toads in the neighbourhood seemed greatly interested, and could be heard hopping toward the experimenter from several directions after each flash!) When, however, the fingers of the free hand were so disposed over the bulb as to completely prevent the escape of any direct light, the luminous surface being the portion of the finger tissue through which the light passed, it was found easy to attract flying males from a distance of as much as twenty-five feet, by flashing immediately after the flash of the male. The reaction was so definite as to leave no doubt of the matter; of ten males captured in perhaps fifteen minutes, nine were obtained as the result of attraction to the experimenter by means of the flash light. For instance, a male was observed to be flying in a direction about at right angles to the path which the experimenter was following, and about fifteen feet ahead and perhaps twenty feet in the air. Immediately after he flashed, the shielded lamp was flashed; the flying insect immediately turned, flying downward and along the line of the path, almost in a direct line for the experimenter's hand. Each time he flashed, the flash was answered, as he drew nearer, and when quite close, he swerved suddenly and alighted on the coat sleeve of the extended hand. One or two of those taken were caught in flight, but most of them were allowed to alight on the coat sleeve, and then captured; they usually landed at a distance not more than about eight inches from the light, running around rather rapidly after lighting, stopping occasionally and waving the antennæ somewhat after the manner of *Photinus pyralis* when mating. It is interesting to note that the distinctly red colour of the light from the flash light after passing through the tissue of the experi-

menter's fingers, did not seem in the least to interfere with the phenomenon, although decidedly different from the colour—to the human eye—of the light of the female insect.

A flash of a flying Lampyrid, closely resembling that of the male of this species, was observed by the writer in the Soldier's Home Park, in Washington, D.C., about April 20, 1911, and was at that time ascribed, by Mr. H. S. Barber, to some northern species not yet recorded from this locality. The distribution of *P. borealis* in the surrounding country has not been worked out, but it would appear possible that the flash seen in 1911 might have been due to a chance male of this species. The spring of that year was rather warmer than usual, possibly accounting for the early date.

Olivier (Accouplements anormaux chez les insects. Premier Cong. Internat. d'Entomologie, 1910, pp. 143-145; see also Gadeau de Kerville, Bull. Soc. Ent. France, 1896, No. 4, p. 85) has mentioned the comparative frequency with which two male lampyrids are found attempting to mate. During this investigation a number of live males of *Pyrractomena borealis* were placed in a test-tube, and upon examining them about half an hour later it was found that two of them had coupled, the penis of the upper one being held between the mandibles of the other; they remained in this position at least two hours. The position of the terminal segments of the upper male were those of normal intromission. There was no evidence that one insect had attacked the other, nor did either appear to be injured.

It may be noted that the odor of this insect, while resembling that of *Photinus pyralis*, is still rather different from that of the latter species.

2. *Photuris pennsylvanica* DeGeer. This species was observed for the first time during the season of 1916, along the Conduit Road between Great Falls and Cabin John Bridge, on the evening of May 27. The insects first appeared as isolated, scattered specimens about 8.15 p.m., but by 9.00 o'clock there were thousands of them flashing in the trees and over the fields. As previously noted (Can. Ent., 1911, vol. 43, pp. 403-4) difficulty had been experienced in connecting the luminosity with the mating conduct in this species. Experiments with the use of the electric flash light

were begun on the above date, using both the naked bulb and the bulb covered with the hand, as just described for *Pyraclomena borealis*, but no evidence of attraction toward the lamp was obtained. In view of the fact that the light of this species is rather more greenish than that of the other local Lampyridæ which have been studied (Coblentz, Can. Ent., 1911, vol. 43, pp. 355-360, and previous papers by the present writer) the experiment was tried of covering the bulb of the lamp with a thin leaf. With this modification of the colour of the light, and by using a long flash, in imitation of that previously described as one of the methods of light-emission of this species, it was found comparatively easy to attract the males so that they would approach the flashed light, but unless the bulb were shaded more as they drew nearer, they appeared to recognize some difference in the light and would fly away again. The response was not entirely uniform, even in the early evening when but comparatively few were flying; later, when several hundred insects might be within the range of the flash, a definite response was decidedly the exception, unless a particular, isolated insect near the electric light responded.

Four distinct types of light-emission on the part of this species were observed, agreeing with those previously reported (Can. Ent., 1910, vol. 42, pp. 358-360). First noted was a series of usually three, though sometimes four or five rapidly repeated flashes of considerable intensity, followed by darkness for several seconds; the flashing thus was repeated at intervals of from not more than three seconds to as much as half a minute. The series of flashes is suggestive of that of the male of *Pyraclomena lucifera*, except that ordinarily not as many separate flashes are given, that there is a distinct interval of darkness between succeeding flashes in the series, and that the flashes in any series appear to be of diminishing intensity, (see diagram, Fig. 6). The specimens which exhibited this type of flash, came to the lamp when given the long flash described, and were *usually, though not always*, found to be males.

The second type of lighting observed was that which the writer has previously described as "a faint glow rapidly increasing in brilliancy. . . . It then ends suddenly. . . ." The only correction to make on this earlier observation is that this flash,

when observed close at hand, is seen not to be a continuous steady flash, but a series of very rapid pulsations, or a flash of very rapid variations in intensity, such as may be observed in a moving mirror image of an arc-lamp operation on alternating current. (See diagram). As compared with the phenomenon of the alternating

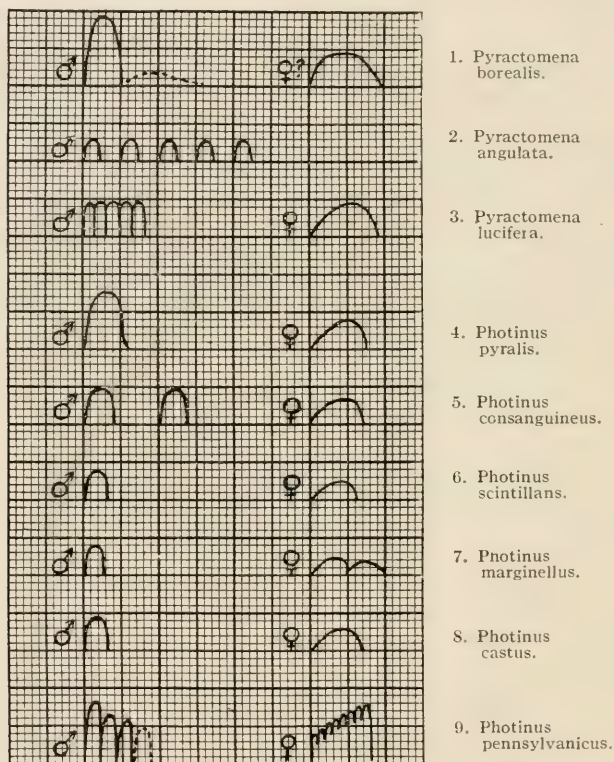


Fig. 6.—Chart showing relative intensities and durations of flashes of American Lampyridae. (1 cm. vertically equals approximately 0.02 candle power; 1 cm. horizontally equals approximately one second in length of curves; space between curves representing flashes of male and female of same species, is arbitrary.

current arc-lamp, the "frequency" appeared to be about 50 per second, rather slower than the lamp (60 cycles). One insect flashing thus was caught on the evening of May 27, and found to be a female, but at this time, none could be attracted to the electric light, by imitating either this flash, or that described in the preceding

paragraph, for the male. Later, notably on the evening of June 17, along the Chesapeake and Potomac Canal, only a few hundred yards from where the first observations were made, females giving this long flash, repeatedly came to electric lights operated in the flashing manner of the male, when used both by the writer and by Mr. H. S. Barber, the bulbs in both cases being shielded by a leaf. The reverse attraction, as described in the foregoing paragraph, was also observed at this time, and had previously been observed by Mr. Barber and the writer, along the Canal on the evening of June 3. There were, however, some curious exceptions: for instance, on the evening of June 5, at the writer's residence, 1901 Jackson St., N. E., this city, an insect giving the long flash was attracted to a lamp giving the flashing light, and when captured proved to be a male; also on the evening of June 13, at the same place, using the electric lamp giving a long flash, two females and four males were attracted, caught and identified. It was not found necessary that either sex be flying to respond; insects at rest on leaves and fences repeatedly responded by flashing to stimulation with the electric lamp, and would sometimes leave their locations and fly to the light. Good results were never obtained unless the light was either shielded with a leaf, or the bulb coated with a solution of malachite green and chlorophyll in collodion.

The third method of lighting observed for this species was that already described as single, not very bright flashes, emitted at intervals of a second or two while the insect is flying through the air in almost any direction, dropping from a tree, or running around on the ground or on the grass. In every instance these insects were found to be females. Operating the electric light in imitation of this flash did not seem to cause attraction of either sex, but in one instance, when a male was observed on a fence rail, giving his usual triple flash, and responding to the electric light flashes in imitation of the usual long flash of the female, the change to the type of flash above described caused him immediately to cease to respond. Provisionally we may regard this as the flash of a pregnant (or hungry) female.

The fourth type of light-emission consists of a single, short, bright flash, repeated at intervals of about four seconds or more. This flash is the least common, and insects flashing thus were

found to be males, and did not respond satisfactorily to the electric light.

Only rarely was attraction between the sexes in this species noted, and as mentioned in a previous paper, it is very rarely that pairs in couple are seen or taken. On account of the great numbers of the insects, and their habit of flying quite high, it is very difficult to follow closely any particular individual or pair. On one occasion a male and female were confined in a tube for some time, hoping that mating would take place; the male flashed irregularly, in single flashes, and the female appeared to answer him, but although she ceased to light and became quiet whenever the male touched her or ran over her back, he appeared to pay no attention whatever to her, and no mating was observed.

Mr. Barber informs the writer that he has frequently noticed dim, fixed points of light in the woods at night, which on investigation, proved to come from the luminous organ of a small adult *Photinus* that was being devoured by an adult *Photuris*, the latter in each case appearing to be a female. In several cases where a male and female of *Photuris* were confined together to secure eggs, the male was found to have been devoured during the night. These appear to be natural habits of the insect, both of which the writer has been able to conform. Mr. Barber also states that he has been informed by Mr. Harry L. Parker, of Hagerstown, Md., who has observed the pupa of this species, that in addition to the anal lights, there is a constant light emitted from the pupal prothorax, which persists through the teneral adult stage, but disappears as the beetle hardens.

3. *Pyractomena lucifera* Melscheimer. Experiments on the evening of May 15, on the attraction of the males of this species to a flashed electric light, were entirely negative. A lamp shielded with a leaf was not used at this time, but was tried later, still with negative results.

4. *Pyractomena angulata* Say. A male of this species was captured at the writer's residence on the evening of June 13; when in flight it gave a series of short, dim flashes, not unlike those described for the pregnant or hungry female *Photuris*, but fainter and of a decidedly orange colour. (See fig. 6). No attraction to the flashed electric light was noted. A female of this species

was taken in flight in mid-day near the same locality on May 30; in fact all females of this species which the writer has taken, have been caught flying in daylight. This flash does not agree with that of the insect which the writer supposed to be a male of *P. angulata* in 1912.

5. *Photinus consanguineus* Lec. This species was observed at Plummer's Island, Md., on June 3, and along the Canal on June 17. The interval between the two flashes constituting the light-emission of the male, was found to be variable, sometimes as much as two seconds. No attraction of the male to the electric bulb could be secured.

6. *Photinus scintillans* Say. The previous observations on this species were plentifully confirmed, but no new facts brought forth.

During this season a flash was observed on two separate occasions, but in the same locality, which does not correspond with that of any known Lampyrids of this vicinity. It consisted of a series of quite rapid flashes, somewhat like that of the male of *Pyractomena lucifera*, but of a distinctly orange tone. Both observations were made long after the normal period of prevalence of the *lucifera*. It was found impossible to capture the insect at this time, and the flash was not seen again, on later visits.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ DIPTERA). PART II.

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

(Continued from page 31.)

The following records also undoubtedly pertain to this species, but in the absence of the material are not included in the type series:

Fort Kent, Aroostook Co., Maine, August 19 (Johnson); White Cap Mt., Maine, August 17, 1905 (Jones); Dedham, Mass., Sept. 4, 1906 (Johnson); Brookline, Mass., Sept. 6, 1906 (Johnson); Cohasset, Mass., Oct. 1, (Bryant); Mt. Marcy, Essex Co., N. Y., July 30, 1913 (Young); Elm Lake, Hamilton Co., N. Y., August 2, 1912 (Young); Hazleton, Luzerne Co., Pa., August 20, 1909 (Dietz).

This interesting late-summer and early-autumn species is similar to *T. calcar* O. S., which, in the male sex, has the stigma of the wings almost indistinct, and the hypopygium very small and provided with short hairs; in *autumnalis* the stigma is brown and the elongate male hypopygium is densely provided with long, dark hairs. In the female sex, the reduced wings of the new species are very curious, (*autumnalis*, length of body 20 mm.; wings 9.5 mm.; *calcar*, length of body 17 mm.; wings 14 mm.), and the ovipositor has the tergal valves strong, powerful, almost straight and rather blunt at their tips; in *calcar*, the tergal valves are shorter, strongly up-curved and more pointed at their tips.

***Tricyphona cervina*, sp. n.**

Allied to *T. septentrionalis* Bergr.; colour light fawn-yellow; antennae brownish black throughout, the basal flagellar segments crowded, the apical ones attenuated; mesonotum with three stripes; ovipositor and hypopygium bright yellow.

Male.—Length 6 mm.; wing 7.8 mm.

Female.—Length 8 mm.; wing 8.5 mm.

Rostrum and palpi dark brown. Antennae dark brownish black, the first segment a little grayish pruinose; first six segments of the flagellum large and closely approximated, the remaining segments elongate and attenuated (as in *T. septentrionalis*). Head brownish gray, clearer gray behind and on the genae beneath.

Mesonotal præscutum light brown with a golden pollen, with three dark brown stripes; the middle stripe is longest, narrowed behind, broadened anteriorly, indistinctly bisected behind by a vitta of the ground-colour; lateral stripes short; scutum and post-notum grayish yellow; scutellum more yellowish. Pleura reddish brown with a sparse gray or grayish-white bloom. Halteres pale yellow, the knobs very slightly darkened. Legs with the coxae yellow, sparsely gray pruinose on the outer face; trochanters dull yellow; femora dull yellow, passing into brown at the tips; tibiae yellowish brown, a little darkened apically; tarsi brown. Wings nearly hyaline; stigma pale brown; veins brown. Venation: petiole of cell R_4 moderate, about equal to or shorter than cell 1st M_2 ; cell 1st M_1 pointed at inner end (as in *septentrionalis*); petiole of cell M_1 long, much longer than either cell M_1 or 1st M_2 ; basal

deflection of Cu_1 at or just beyond the fork of M , about in a line with cross-vein $r-m$; cross-vein m rather indistinct.

Abdominal segments dark brown, the caudal and lateral margins narrowly paler, hypopygium with the pleurites bright yellow.

The female is similar to the ♂ but slightly larger, full-winged; ovipositor powerful, yellow, strongly upturned.

Habitat.—Colorado.

Holotype, ♂, Platte Cañon, Colorado, July 17, 1915, (Osler.)

Allotype, ♀, with the type.

This little species differs from both *debilis* Will. and *vitripennis* Doane. in the considerably smaller size; it differs from *debilis* in the paler fawn colour of the body, the long petiole of cell M_1 , the structure of the antennæ, and in numerous other details; from *vitripennis* in the gray head, dark antennæ, differences in the thoracic pattern and colour of the abdomen and its appendages. It differs from the more closely related *septentrionalis* Bergr. in the unmarked wings and fawn-coloured body.

***Tricyphona glacialis*, sp. n.**

Allied to *T. debilis* Will.; colour dark brown; antennæ dark brown throughout, the flagellar segments oval to rounded-oval, not attenuated; wings with a pale brown suffusion; cell 1st M_2 and M_1 very long; abdomen dark brown, the basal sternites more yellowish.

Male.—Length 9.6 mm.; wing 10.6 mm.

Rostrum and palpi dark brown. Antennæ dark brown, the segments of the flagellum oval, the basal ones not crowded, the apical ones shortened, almost rounded. Head broad, black, very sparsely grayish pruinose; frontal tubercle distinct, high.

Mesonotum dark brown, very sparsely gray pruinose on the postnotum, the scutellum paler, more yellowish. Pleura dark brown, gray pruinose. Halteres very long and slender, brown, brightened at the extreme base. Legs with the coxæ brownish yellow; femora dull yellow, passing into brown on the apical third; tibiæ brownish yellow, a little brighter basally; tarsi dark brown. Wings with a pale brown tinge; stigma indistinct; veins brown. Venation: petiole of cell R_4 moderate, a little shorter than the elongated cell 1st M_2 ; petiole of cell M_1 about one-third the length

of the cell and of cell 1st M_2 ; cross-vein m connects M_{1+2} with M_3 , weak and tending to atrophy; Cu_1 leaves M_3 before mid-length of the long cell 1st M_2 .

Abdomen elongated, tergites dark brown, the caudal margins of the segments narrowly paler; basal sternites more yellowish than the terminal segments; hypopygium brown.

Habitat.—Alaska.

Holotype, ♂, Sitka, Alaska; June 16, 1899 (Kincaid).

Allotype, ♀, Saldovia, Alaska; July 21, 1899 (Kincaid).

Paratypes, ♂ ♀, Yakutat, Alaska; June 21, 1899 (Kincaid); ♂, Virgin's Bay, Alaska, June 26, 1899 (Kincaid); ♂, Saldovia, Alaska, July 21, 1899 (Kincaid).

The type is in the collection of the United States National Museum; the species is based on material taken on the Harriman Expedition, and was determined by Coquillett as being *T. debilis* Will.

The species agrees with *debilis* in many respects, but the general coloration is dark brown, not yellow; the basal segments of the antennæ are not reddish and the venation is different, the cells 1st M_2 and M_1 being greatly elongated. The abdomen and halteres are longer than is usual in this group of the genus.

GEOMETRID NOTES.

THE GENUS *DYSSTROMA* HÜBNER.

BY L. W. SWETT, WEST SOMERVILLE, MASS.

The genus *Dysstroma* Hüb. (Verz. p. 333, 1825) with its type *truncata* Hufn. seems to be a natural group by itself. Hulst (Trans. Am. Ent. Soc., vol. XXIII, p. 283, 1896) under *Hydriomena*, cites *truncata* Hufn. as the type of *Dysstroma*. Warren and Hampson both refer the *truncata* group to *Polyphasia* Stephens, but treat it as a separate genus (Proc. Zool. Soc., p. 373, 1893, and Ind. Moths, III, p. 378). Mr. L. B. Prout points out in Trans. London Ent. Soc., part XVIII, p. 33, 1908, that *Polyphasia* cannot hold, as Hübner's name *Dysstroma* has priority. According to Mr. Prout's and my own views, what we have been calling *truncata* in North America is really *citrata* Linné ("Fauna Suecica," ed. II. p. 332, 1761).

February, 1917

Werneburg (Stett. Ent. Zeit., vol. XIX, pp. 49-57, 1855) shows, I believe for the first time, that *citrata* Linné is related to *truncata*. In Linné's original description of *citrata*, he speaks of the fore wings having a grayish central band, with a variegated outer margin and reddish yellow costal spot. *Dysstroma citrata* Linn. with its variations appears to be our American form, and *truncata* Hufnagel, though closely resembling it, is quite distinct. There is much doubt also as to the occurrence of *truncata* Hufn. in South America, as I have never seen authentic specimens of it.

I shall use the term *aberration* in this paper in place of *variety* in conformity with the practice of the European specialists, while *variety* will be employed in the sense of local race.

The typical *Dysstroma citrata* Linn., or gray form with variegated outer margins, seems to be rare, and is only found in cold climates and high altitudes. Our commonest form, which generally stands in collections as *Dysstroma truncata* Hufn., is *D. citrata* Linn. aberration *punctum-notata* Haworth, with the central band of the fore wings clear white. In Dyar's List, page 281, the aberrations of *truncata* Hufn. and *citrata* Linn. are badly confused, but I shall only consider *citrata* here; so the rest may be referred to *truncata*. *Dysstroma citrata* Linn., and its aberrations may be listed as follows:

I. *Dysstroma citrata* Linné.—Fore wings with a gray central area, variegated outer margin with reddish yellow costal spot.

This appears to be rather a rare form, probably occurring in the mountainous regions and colder climates. The central band of fore wings is even, uniform gray, with enough variegation in the outer margins not to be unicolorous. I have this form, if I have identified it correctly, from Atlin, British Columbia, collected by Mr. Anderson. The gray form taken in the East is not exactly the same, but I will place it here tentatively until more is known of the group and the genitalia can be studied. I have not seen aberration *fusca* Prout (Trans. London Ent. Soc., part XVIII, p. 50, 1908), which is unicolorous dark gray without variegations, but I hardly think it applies to the forms mentioned above.

Ab. (a) *punctum-notata* Haworth (Prod. Lep. Brit., p. 26, 1802).

This form has the central band of the fore wings clear white, the intra- and extradiscal lines not touching. In most collections it has been placed under *truncata*, in error, though the resemblance is close, but beneath, on hind wings, the extradiscal line of *citrata* has a much sharper angle. *Punctum-notata* Haw. occurs in most of the Eastern States and a few of the Western, and also in British Columbia. Packard seems to have found it quite abundant in the White Mountains of New Hampshire, and has quite a series in his collection from there. Mr. Prout has pointed out the distinctiveness of this aberration from *truncata* Hufn., and was one of the first to do so.

Ab. (b) *immanata* Haw. (Lep. Brit., II, p. 323, 1809). This form has the prominent, reddish yellow costal spot, with central band solid blackish gray, and brownish variegated outer margins. It appears to be rather a rare form in North America, but it may be more common in the north. I have specimens from Victoria, B.C., received from Mr. E. H. Blackmore, and also from Mt. Washington, New Hampshire. The black, central band will distinguish it at once from all other forms.

Ab. (c) *simpliciata* Walk. (List Lep. Brit. Mus., XXV, p. 1422, 1862).

This form has the central band blackish as in the aberration *immanata* Haw., but there are white spots at costa and inner margin. I have never taken exactly this form, the white spots in my specimens not being intense enough, but rather grayish. Possibly it is nearer the aberration *tysfjordensis* Strand. (Nyt. Mag. Nat., XXXIX, p. 62, 1901). The latter form is said to have a gray black central band with gray spots at costa and inner margin. I list these two forms provisionally, but we get aberrations which are very close to them if not identical. I believe these to be rather northern forms and not very common.

Ab. (d) *insolida* Prout (Trans. London Ent. Soc., p. 59, 1908).

This form has the central band pale gray, with the inner and outer lines on either side strongly contrasting black. I have two specimens from British Columbia which approach it very closely. The black, contrasting lines on either side of the central band will readily separate this form from all others.

?Ab. (e) *rufibrunnea* Warren (Nov. Zool., VII, p. 181, 1900).

This seems to be a form close to *punctum-notata* Haw., in which the white central band is more or less suffused with light reddish brown. The types, two females, came from Argentine, South America, so there is always a slight doubt as to their standing. Mr. Prout, who has seen the types, believes they are aberrations of *citrata*. The form I have identified as this one came from Mr. E. H. Blackmore, Victoria, British Columbia, and seems quite rare. There are several other aberrations of *citrata* Linn. found in Europe, but as I have not seen them as yet from North America, I think it is better not to list them.

2. Var. *brunneata* Packard, (Proc. Bost. Soc. Nat. Hist., XI, p. 47, 1867 [1861 in error, in Dyar's list]; Monograph, p. 108, pl. VIII, fig. 38, 1876).

This northern form was described from Labrador by Packard, and is very closely allied to *citrata* if not a variety or race of it. It is a small, stunted form, brown-shaded, with a cinereous central band, three times as wide at costa as on inner margin. It is difficult to say whether this should be listed as a distinct species or variety, as I have only seen two or three specimens other than the type. Taylor's *Mesoleuca casloata* resembles *brunneata* Pack., but is larger. They are, however, closely allied. In Dyar's list *brunneata* Pack. is incorrectly placed under *truncata* Hufn., and should be referred to *citrata*. In Ent. Zeit. Stettin, XXV, p. 160, 1874, Mœschler described "*Cidaria suspectata*," which must be close to *brunneata* according to the description. There is a copy of the original description in the Packard Monograph, page 130, 1876. The type of *suspectata* is said to be in the Staudinger collection and was taken in Labrador, as was *brunneata*. Both Staudinger and Mœschler later regarded *suspectata* as identical with *brunneata*, but there is a slight doubt as to the correctness of this view. The older authors did not have a very clear eye for differences, and in most cases were not very careful in their comparisons. Packard in the Monograph mixed the forms, as figure 38, plate VIII, is evidently *Dysstroma citrata* ab. *punctum-notata* Haw., the white central band of the fore wings showing plainly. On the same plate, figure 39, is *brunneata* Packard, while figure 40 is probably *ethela* Hulst. In the Packard collection there is a specimen just

like figure 40 from Victoria, B.C., which is *ethela* Hulst. Figure 41 of the same plate is our eastern *hersiliata*, while figure 42 is *Dysstroma* (*Mesoleuca*) *occidentata*, described by Taylor in the Canadian Entomologist, vol. XLII, p. 86, 1910. Note the sharp indentation of the intradiscal line in the figure, on the median vein, also the peculiar central band and wide basal space. There is always a chance of error in determining species from figures, but as Packard had the specimens in his collection, from which the figures were made, I think I have identified them correctly.

Dr. Dyar (Proc. U. S. Nat. Mus., vol. XXVII, p. 897, 1904) describes the larvæ of *hersiliata* Guenée and mentions rearing them on currant. Dr. Dyar also mentions that there is considerable variation in this species, there being a dark and a light form, and he thought the latter might be *ethela* of Hulst. Both forms will have to be studied as they seem to differ from our eastern *hersiliata*. Possibly they may be forms of *occidentata* Taylor.

Traversata Kellicott (Bull. Buffalo Soc., Vol. V, p. 45, 1886 [*transversata* in error in Dyar's List]) is not to be considered under *citrata* (*truncata*) as it belongs to another group.

Atrifasciata Hulst. (Entomologica Americana, vol. III, p. 214, 1887) described from one female from California, turns out to be a *Eustroma* or *Lygris* and not *Cleora* or *Mesoleuca* as placed by Hulst. (See Grossbeck's notes in Trans. Amer. Ent. Soc., vol. XXXIII, p. 338, November, 1907.)

Mesoleuca mulleolata Hulst is placed incorrectly as a synonym of *truncata* in Dyar's List. It was described in the Bulletin of the Brooklyn Entomological Society, vol. IV, p. 26, 1881, and is a very large species and very distinct when once separated. There were two types from Colorado in the Hulst collection, and I shall restrict the type to the white banded form there. This, in a general way, resembles the aberration *punctum-notata* Haworth cf *citrata*, but the basal band of the fore wings has two very strong, toothed projections and the intradiscal band is inwardly less crenulate than in *citrata*. The extradiscal line of the fore wings runs straight from costa about 2.5 mm. before the first projecting tooth, and also the costal reddish spot is more accentuated than in *citrata*. The hind wings of *mulleolata* Hulst are darker than those of *citrata*, and the extradiscal line makes a much sharper angle. Then

again, *mulleolata* emerges a month earlier than *citrata*, namely in June, while the latter appears in July and August. The genitalia also show it to be distinct from *citrata*, the terminal spines being nearly three times as long and much stouter. The species, therefore, should be considered as distinct and so listed. Hulst's types are not in very good condition and more or less rubbed, so this is probably the reason why the older authors regarded it as *truncata*. I have specimens from Mr. Fernekes from Tacoma, Washington, and from Mr. Blackmore and Dr. Dyar from Victoria, B.C., and the Rocky Mountains. It is evidently a rare species in collections, but probably the characteristic locality has not been found.

Mulleolata Hulst has several striking forms which correspond to the forms of *citrata* and should be described, so that they may be understood. I may perhaps be criticized for naming aberrations, but I feel that we cannot correctly understand the limits of variation unless we do so. In many species it is absolutely necessary to do this, as different species have corresponding forms and would otherwise be confused with one another. I think it unnecessary to go as far as the European specialists do, but certainly every distinct form should have a name, and both Dr. Bastelberger and Mr. Prout concur in this view. The difficulty is to avoid splitting the forms too finely, as in the case of *truncata* and *citrata*. It is better to take a conservative view of them where confusion might arise, e. g., in the case of the white-banded forms of *citrata* and *mulleolata*, or the black-banded forms of the same, or in the case of many of the species of *Hydriomena*.

We may next consider the forms of *mulleolata* Hulst which seem to be worthy of names.

Dysstroma mulleolata Hulst, ab. *sobria*, nov.

Expanse 36-39 mm.

This is the black-banded form of *mulleolata* Hulst, corresponding to ab. *immanata* Haworth of *citrata*. The central band of the fore wings is solid black with no markings or whitish spots visible. The wing pattern is otherwise the same as in normal *mulleolata*, except that possibly the brown is a trifle more yellowish extradiscally. The aberration *sobria* can be easily recognized by the solid black central band and the date of appearance. Apparently this is one of the rarer forms, as other specimens show the transition

between the black-banded and the white-banded forms, the bands having begun to break up into spots of white or gray.

Holotype.—♂, Victoria, B.C., June 22, 1914, E. H. Blackmore, in my collection.

Dysstroma mulleolata Hulst, ab. ***subumbrata***, nov.

Expanse 39–40 mm.

In this form the black central band has begun to break up into grayish spots, especially at costa and inner margin. This form tends to show the transition from the black-banded to the gray or white-banded form. It corresponds to the aberration *simpliciata* Walker and *tysfjordensis* Strand of *citrata*. The outer area has the normal wing pattern of *mulleolata*, but in the character of the central band it is allied to *sobria*, except that the band is not solid black but broken into gray spots.

Holotype.—♂, Victoria, B.C., June 14, 1914; from E. H. Blackmore, in my collection.

Allotype.—♀, Victoria, B.C., June 24, 1915; in the collection of Mr. Blackmore.

Paratypes.—Victoria, B.C.; ♂, June 2, 1914; ♀, June 16, July 22, 1914, and June 26, 1915; in coll. Blackmore.

Dysstroma mulleolata, ab. ***ochrofuscaria***, nov.

Expanse 37–39 mm.

This form has the central band whitish, suffused with reddish brown, in fact, the whole fore wing is more or less suffused with brownish. It seems to be a somewhat rare form and represented in few collections and corresponds to ab. *rufibrunnea* Warren of *D. citrata*. It is yellowish along the costa just beyond the extra-discal band of the fore wings, and has a large, reddish brown costal spot at the anal angle. The hind wings have a reddish tinge along the outer margin.

Holotype.—♂, Victoria, B.C., June 27, 1915; in coll. Blackmore.

Allotype.—♀, Vancouver Island, B.C., July 16, 1905; in my collection.

Paratypes.—Duncans, B.C.; ♂, June 14, 1910; in coll. A. W. Hanham; ♀, Aug. 7, 1908; in coll. G. O. Day.

The forms of *D. citrata* and *mulleolata*, together with related species I have seen, may be listed as follows:—

1. *Dysstroma citrata* Linn. (gray central band).
 - (a) *Ab. punctum-notata* Haw. (white central band).
 - (b) *Ab. immanata* Haw. (black central band).
 - (c) *Ab. simpliciatata* Walk. (black central band, white spots at margins).
 - (d) *Ab. tysfjordensis* Strand (black central band, gray spots at margins).
 - (e) *Ab. insolidata* Prout. (gray central band, black at edge).
 - ?(f) *Ab. rufibrunnea* Warren (white centrally, suffused with reddish brown).
 - ?var. *brunneata* Pack. (blackish central band, brownish basally and extradiscally).

Syn.? *suspectata* Moesch.
2. *Dysstroma mulleolata* Hulst.
 - (a) *Ab. sobria* Swett.
 - (b) " *subumbrata* Swett.
 - (c) " *ochrofuscaria* Swett.
3. *Dysstroma hersiliata* Gn.
 - " *ab. mirandata* Taylor.
4. " *walkerata* Pears.
5. " *occidentata* Taylor.
- " *ab. mitata* Taylor.
6. " *ethela* Hulst.
7. " *casloata* Taylor.
8. " *boreata* Taylor.
9. " *decorata* Taylor.
10. " *hulstata* Taylor.

There are other species to be added, but I have not had the opportunity to examine them in series, so will omit them for the present. The aberrations *simpliciatata* Walker and *tysfjordensis* Strand, I have doubtfully referred to our fauna, but at least we have very closely allied forms which, if not identical with the European forms, are hardly distinct enough to warrant description. A very interesting fact is brought forth by Edelston (Zool., XXI, page 8784), viz., that *truncata* is normally double brooded and passes the winter in larval form, while *citrata* is single brooded and passes

the winter in the egg. The larva of *truncata* differs from that of *citrata* in colour and form of anal joints.

In conclusion I wish to thank Mr. E. H. Blackmore and also Messrs. G. O. Day and A. W. Hanham for suggestions and loan of specimens. I am also deeply indebted to Mr. L. B. Prout, of London, England, for notes and references.

ON MILITARY SERVICE.

The following is a list of the officers and employees of the Entomological Branch of the Dominion Department of Agriculture, Ottawa, who have enlisted for Overseas Service either in the Canadian or Imperial Forces:

H. F. HUDSON, B.S.A.—Field Officer, Strathroy, Ont., 16th Battery, C. F. A. Wounded and permanently disabled for further active service.

E. H. STRICKLAND, M. Sc.—Field Officer, Lethbridge, Alta., Machine Gun Section, 196th Battalion (Western Universities), C. E. F.

H. S. FLEMING.—Messenger, Ottawa, 52nd Battery, C. F. A.

F. M. MACKENZIE.—Assistant, Fredericton, N.B., Princess Patricia's Canadian Light Infantry, (P. P. C. L. I.).

*F. W. WALSH.—Assistant, Lethbridge, Alta., Welsh Fusiliers.

H. S. BRODIE.—Assistant, Agassiz, B.C., Imperial Forces.

H. CURRAN.—Assistant, Vineland Station, Ont.

C. A. WILLIAMS.—Inspector, Fredericton, N.B., 23rd Battery, C. F. A.

G. F. BALL.—Inspector, Fredericton, N.B., 104th Battalion, C. E. F.

H. S. FLEWELLING.—Inspector, Fredericton, N.B., P. P. C. L. I.

**J. C. SHIPTON.—Assistant and Inspector, Annapolis Royal, N.S., P. P. C. L. I.

L. M. HOW.—Inspector, Annapolis Royal, N.S., 112th Battalion, C. E. F.

T. H. H. FORTIER.—Inspector, Annapolis Royal, N.S., Heavy Artillery, C. E. F.

W. L. HARRIS.—Inspector, Annapolis Royal, N.S., Heavy Artillery, C. E. F.

*Killed.

**Died in Hospital in France.

S. N. LORD.—Assistant, Ottawa, 75th Battalion, C. E. F.

T. RANKIN.—Assistant, Ottawa, P. P. C. L. I.

*A. H. BUSH.—Inspector, Vancouver, B.C., Pioneer Battalion.

The above list would be considerably longer had it been possible for the Government to release for military service more of the scientific officers. Most of the officers of the Branch have applied for leave of absence for military service, but in view of the importance which the Government lays on the maintenance of the agricultural production of the country it has decided that such trained men are serving the country to the best advantage by continuing their present work, especially in view of the scarcity of trained men, than by undertaking duties of a military character, and for this reason it has not been possible to release more than those whose names are included in the above list.

THE BAY FLEA-LOUSE, *TRIOZA ALACRIS* FLOR. AS A NEW PEST IN NEW JERSEY.

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

For the past several years, this psyllid has been present in several green-houses in New Jersey, but only recently has it increased numerically enough to disfigure seriously its host, *Laurus nobilis*, the victor's laurel of the ancient Greeks. Its presence on bay trees can be readily detected by the curled, discoloured leaves, usually at the tips of the branches, containing what appear to be cottony masses. Upon uncurling a leaf, the nymphs are easily seen, clothed in a white, waxy secretion. As a rule, the edges of infested leaves are rolled in tightly toward the mid-rib and become thick, distorted and of a whitish colour, giving the tree in severe infestations, a sickly and unwholesome appearance.

In "Ziekten en Beschadigingen der Tuinbouwgewassen," by M. Van Den Broek en P. J. Schenk (Holland, 1915), the authors state that the bay leaf flea, so called, overwinters in the adult stage, appearing in the spring and depositing eggs on the undersides of the leaves, and that bays in and out of green-houses are

*Killed.

subject to injury. They also state that it is not a serious pest in Holland. In New Jersey, it is customary for owners of bay trees to keep them out of doors during the summer, and cool, storage sheds where the temperature is around 38 and 40 degrees F. during the winter. It is during the summer months, of course, when the trees are either outside or under glass that most of the damage takes place. Sometimes nearly every leaf on a tree is curled and discoloured, but as a rule it is the young, developing leaves which are infested. Trees thus disfigured are not salable, and when one considers that bay trees sell at from \$10.00 to \$100.00 and more for single specimens it is readily seen that a considerable money loss can be laid at the door of this psyllid.

Coming to remedies, picking off and destroying the infested leaves is one method, practical only if the infestation is slight or the number of infested trees small. Eight ounces of Black Leaf 40 plus eight pounds of whale-oil soap to one hundred gallons of water has been used in New Jersey with a fair degree of success as a summer spray. It is impossible, however, to reach the nymphs protected by the tightly curled edges of the leaves. According to Dafert and Kornauth in the Report on the Work Done at the Imperial and Royal Chemical Research Station in Vienna, 1913, pp. 80-95, a review of which appears in the Review of Applied Entomology, Series A, vol. II, 1914, p. 482, cyanide fumigation was tried against *Triosa alacris* Flor., on laurel with complete success. The reviewers state that the American 1-1-3 formula was used, but nothing is said about the cubic contents, temperature, length of exposure, etc.

At one place in New Jersey, where the infestation was severe during the summer and not completely controlled by the nicotine and soap spray, many last stage nymphs and adults were found on the trees November 15, after they had been placed in a storage shed, and it seems quite probable that fumigation with hydrocyanic acid gas at this time might be effective, inasmuch as both forms were fairly active. The adults evidently hibernate on the bay trees and become active as the temperature increases. Another dealer in bay trees in New Jersey allows his trees to remain out of doors until late in the season, taking them in only shortly

before freezing weather is likely to set in, and his trees are rarely troubled by the psyllid. This, however, may be only a coincidence.

This pest was evidently introduced into New Jersey on bay trees imported from Belgium, as practically all of such trees come from that country, and psyllid injured leaves are frequently noted when the stock arrives. Inasmuch as many of the trees are later shipped out of the State, it would not be strange if specimens of *Triosa a'acris* were turned up in other places, especially the Southern States. Van Duzee in his "Check List of the Hemiptera of America, North of Mexico," records it from California with *lauri* Targ., as a synonym.

ADDITIONS TO THE LIST OF MISSOURI CICADELLIDÆ (JASSOIDEA).

EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY.

The following list of 25 species is offered as an addition to the "Preliminary List of Jassoidea of Missouri with Notes on Species," which was published by the writer in joint authorship with E. S. Cogan in the Ohio Journal of Science for December, 1915, vol. XVI, No. 2, pp. 71-78. H. L. Horsfall published an addition of 29 species in the same journal for May, 1916, vol. XVI, No. 8, p. 53. The present paper brings the total number of species reported from Missouri up to 152:

Macropsis occidentalis Van D. Adults were swept from willows at Charleston during May.

Macropsis gleditschiæ O. & B. Quite numerous during May and June in southeastern counties. Captured principally from locust trees.

Macropsis tristis Van D. A specimen from central Missouri is in the collection of the U. S. National Museum.

Idiocerus ramentosus Uhl. Rather abundant on willows during late spring and early summer months in Southeast Missouri.

Idiocerus pallidus Fh. A few adults captured from an alfalfa field at Branson, in the heart of the Ozark Mts.

Idiocerus lachrymalis Fh. Occurs throughout the State, but not abundant.

Homalodisca liturata Ball. Occasional specimens taken in southern counties. Swept from weeds.

Gypona modesta Spangb. Two adults captured at Poplar Bluff.

Gypona bimaculata Spangb. Collected by sweeping rank growth in marshes near Charleston.

Platymetopius acutus var. *dubius* Van D. Rather numerous on grass in southwestern part of the State.

Deltocephalus melscheimeri Fh. Occasional specimens captured. Occurs throughout the State.

Athysanus comma Van D. One adult taken at St. Louis.

Athysanus anthracinus Van D. Rather numerous in western counties.

Phlepsius fulvidorsum Fh. Numerous on willows growing along creeks and rivers in Southwestern Missouri.

Phlepsius nebulosus Van D. Occasional specimens taken near Charleston.

Thamnotettix brittoni Osb. A few adults were swept from weeds at Charleston.

Chlorotettix balli Osb. Specimens captured were all from northern parts of State.

Chlorotettix lusorius O. & B. Occurs most numerous in eastern counties.

Jassus melanotus Spangb. Collected by F. M. Moody at Branson, by sweeping weeds growing on high ridges of the Ozarks.

Tinobregmus pallidus Osb. Two adults captured by F. M. Moody from low shrubs growing wild in the woods at Branson.

Cicadula punctifrons Fall. Few adults captured at Dexter.

Empoasca flavescens Fabr. Abundant on willows at Branson.

Empoasca trifasciata Gill. One specimen captured at Charleston, July 26.

Erythroneura illinoiensis Gill. Rather abundant in eastern counties.

Erythroneura crevecœuri Gill. Not common. Occasional specimens taken at Charleston.

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POPULAR AND PRACTICAL ENTOMOLOGY.

PRECIPITATION IN RELATION TO INSECT PREVALENCE AND DISTRIBUTION.

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In this paper an attempt is made to draw attention to a few instances of how humidity, chiefly in the form of rain or snow, has been and is instrumental in either aiding or curtailing the spread of insects over the country, particularly in the Prairie Provinces.

There are very few insects, if any, that can live through all their stages without the aid of moisture. Most of them, indeed, are very much dependent upon it, especially in their larval stages. Numerous examples could be given, and a suitable one is provided in the various races of Tiger Beetles (*Cicindela*). We find these beetles from haunts in close proximity to water, to habitations on plains of drifting sand, apparently far removed from it; yet an examination a few inches below the surface, in the latter place, will show that the sand, if not equally moist, is at least sufficiently so for the wants of the beetle larvæ, which are easily able to burrow down to it. There are occasions, however, when the insects' prairie haunts become very dry; at such times there is reason to believe that some of the larvæ perish while the remainder retire to the bottom of their burrows and remain inactive until such time as rain once more moistens the soil.

While most insects require water in some form or other, there are certain kinds which seem to thrive best when it is least prevalent, and are only found in the driest situation. In this class we have most of our locust pests, and the celebrated Rocky Mountain Locust (*Melanoplus spretis*) supplies a good example. This locust, as is well known, has caused enormous losses in years gone by and has invaded our territory on more than one occasion. There is somewhat of a mystery surrounding this insect at the present time

which may, indeed, never be solved. We know that its breeding grounds once extended over a very wide area, much of this having been classed as permanent by Riley and others who investigated the plague at that time. At present, however, the insect seems to have vanished completely. Indeed, there are some who would place it with the Passenger Pigeon as an object of the past. It seems almost incomprehensible, however, that such can be the case. More probably the real permanent breeding grounds are more restricted than was supposed, and the locust will yet be located either by the discovery of its real haunts or by a new invasion following favourable weather conditions for breeding purposes. This, however, is beside the question. What I wanted to point out was that the Rocky Mountain Locust always invaded Western Canada during a dry season, arriving in swarms from elsewhere in July or August. As this was the time of oviposition, eggs were soon deposited in vast numbers, and, as a result, crops naturally suffered much more the following year than they did on the insects' first appearance. While the locusts were able to breed for a season or so in the invaded territory they seldom remained long. Frequently an excess of moisture to what they had been accustomed to produced sickness from which many died, while others taking advantage of sunny days and favourable breezes drifted to parts unknown.

In other words, dry weather had enabled them to overstep their usual breeding grounds, only, however, to be driven out or killed by a return to normal climatical conditions. The same dryness which induced an invasion of Rocky Mountain locusts was also instrumental in increasing the indigenous species of *Orthoptera*, so that such kinds as the Lesser Migratory Locust (*M. atlantis*) became almost as destructive as its close relative mentioned above, while many other species were sufficiently numerous to aid materially in the work of destruction. We have another example of an insect's control by conditions of humidity alone in the Western Wheat-stem Sawfly (*Cephus sp.*). In this instance a lack of precipitation causes a dearth of the flowering stems of grasses in which the larval life is passed, resulting in a decrease of the species in proportion to prevalence of suitable grass stems for breeding purposes. This, of course, relates to natural conditions before

the husbandman made his appearance. The sowing of cereals has altered matters so that when the grasses fail to produce stems the saw-flies were able to continue their increase by attacking wheat and rye, with the result that they are now a serious pest.

Yet another insect which is checked by lack of moisture is the Hessian Fly. Dry seasons are generally recognized as anti-fly years and in Manitoba the partial second brood is frequently destroyed outright by a premature ripening of the grain, due to dry, hot weather conditions in late July. A knowledge of this fact is often of the greatest importance in forecasting as to the probabilities of a Hessian-Fly outbreak. It also comforts us in the thought that weather conditions will seldom remain favourable to the insect for any length of time, though we have the unpleasant knowledge that good crop years are frequently best adapted to Hessian-Fly increase. Moisture is probably still more important over northern latitudes, in the form of snow when it provides a thick covering to the objects beneath, protecting them from both frost and sun. It is really astonishing how a blanket of snow will afford protection even to the tender plants. For instance, potatoes have more than once survived the winter, even in our invigorating Manitoba climate where the temperature, at times, attains a minimum of fifty below zero. Yet expose these same potatoes directly to four or five degrees of frost and they will present a sorry spectacle next morning.

Snow is unquestionably a very important factor in preserving insect life in winter time, and there is no doubt that it is largely responsible for the preservation of many forms which would perish without its covering. Perhaps there is no better example of its preserving influence than was shown by the Colorado Potato Beetle. This beetle invaded Manitoba a number of years ago, but did not become a serious pest until comparatively recent times. It had, however, gradually extended its range northward. In 1913 its ravages were severely felt in Southern Manitoba as far north as latitude 50° and to a lesser degree for some distance farther north. In the winter following, that is 1914-15, there was a great scarcity of snow in portions of the province so that some places used wheels throughout the winter. The result of this lack of snow was that the frost penetrated considerably deeper into the ground than

usual. While an occasional thaw came in direct contact with the surface, thus providing a thawing and freezing condition known to be detrimental to insect life, there is no doubt that several species suffered in consequence, but the Colorado Potato Beetle, as a rule, burrows sufficiently deeply to escape the thawing effect, hence frost alone was to be reckoned with.

The result of this lack of snow was very marked the following May. Beetles which had gone into winter quarters in a healthy condition were found huddled together in a state of death, not a single living example being located in the more exposed situations, though later in the season odd individuals turned up on potato plants forming the nucleus for future generations. The country was by no means all affected in the same way; some parts had a light covering, others a foot or more. Consequently the amount of snow necessary for protection could be ascertained with reasonable accuracy. As was mentioned above, complete lack of snow, or less than three inches, did not afford sufficient covering for the beetles, the few survivors having probably sought shelter beneath some straw or brush pile. Where there was a depth of snow amounting to from four to six inches the survivors were considerably increased. At eight inches about half the beetles survived, while a foot or more of snow apparently produced complete immunity from frost.

In the vicinity of the Entomological Laboratory at Treesbank very few beetles escaped, which proved a great boon to potato growers. The effect of this winter killing is still very marked (1916), less than one per cent. of the plants being infected. Near Winnipeg, on the other hand, where the snow fall was ample no mortality was noticeable among the beetles, and they have continued to be a serious pest there.

From the above account it is evident that snow plays an important part in the preservation of animal life, it also saves many a garden plant from destruction. Under normal conditions it will continue to afford protection to the Colorado Potato Beetle, but we can at least see that there will be years of severe check, like the winter of 1914-15. While there is every reason to believe that those portions of the country where snowfall is light will never prove a prolific breeding ground for that insect.

THE HEATH COLLECTION OF LEPIDOPTERA.

BY F. H. WOLLEY DOD.

(Continued from vol. XLVIII, p. 380.)

Anytus obscurus Sm. The palest specimens stood separated as *privatus*, of which *obscurus* is very likely only a suffused variation. The more suffused specimens stood as *profundus*, which Smith described from Manitoba as a species distinct from *obscurus*, the latter being described from Calgary on the same page. His subsequent attempt to prove the two distinct on genitalic characters is quite unconvincing. I use *obscurus* as the prior name by a page.

Anytus (Fishia) derelicta Hampson. Most of the specimens stood as *Hadena relecina* Morr., an old and widespread error which Heath had apparently never had corrected. One with paler secondaries than usual was separated as *yosemita* Grt., but wrongly. *Instruta* Smith, described from De Claire, Man., may prove to be a prior name to *derelicta*.

Ufeus satyricus Grt. Some specimens were separated as *plicatus* Grt.

Mamestra mystica Sm.

Mamestra imbrifera Gn. Heath repeatedly sent me this species as *rogenhaferi*, under which name there is a specimen in the Rutgers College from Winnipeg, apparently distinct from anything else known to me.

Mamestra purpurissata Grt. Mostly standing as *juncimacula* Sm.

Mamestra meditata Grt. Most of the specimens were near var. *columbia* Sm. Two specimens of *Tricholita signata* stood mixed with the series.

Mamestra lustralis Grt. var. *cervina* Sm. Smaller and duller than the typical form.

Mamestra segregata Sm. (syn. *gussata* Sm.) and var. *negussa* Sm.

Mamestra detracta Walk. var. *neoterica* Sm. Smaller and duller than the typical form of the species, as is so frequently the case with Manitoba races. One series stood as *goodellii*, and another as *acutermia*. Two more specimens, one of them an unusually contrasting variety, stood elsewhere as *cuneata* Grt., which they in no way resembled.

Mamestra distincta Kbn. One female, without date.

Mamestra chunka Sm. One female, May 29th, 1913, standing in company with one *trifolii* Rott., and one *mutata* Dod, under the latter name.

Mamestra farnhami Grt.

Mamestra obesula Sm.

Mamestra atlantica Grt.

Mamestra radix Walk.

Mamestra subjuncta G. & R.

Mamestra grandis Bdv. Some under their correct name, and another series under *legitima* Grt.

Mamestra lubens Grt.

Mamestra trifolii Rott. Also a series of mottled specimens erroneously as "var. *trifolii*, var. *albifusa* Walk. *oregonica*."

Mamestra rosea Harv.

Mamestra picta Harris.

Mamestra assimilis Morr.

Mamestra adjuncta Bdv.

Mamestra tacoma Strk.

Mamestra lilacina Harv.

Mamestra goodellii Grt. var. *acuterminalis* Sm. Standing, (with one *Hadena plutonica*) as *neoterica* Sm. It must be readily admitted that *acuterminalis* and *neoterica* are often most puzzlingly alike in Manitoba, though I had not before imagined confusion possible. It was surprising how well Heath had them separated, though he had the names reversed. Two specimens of *acuterminalis* also stood apart as "*Noctua*, not identified by Smith."

Mamestra obscura Sm. Most of the series were more mottled with brown than is usual in Alberta specimens.

Mamestra renigera Steph.

Mamestra olivacea Morr. Smith described the race from this region as *lucina*, but I cannot see that the name is anything but a synonym of *olivacea*.

Mamestra lorea Gn.

Mamestra anguina Grt., (syn. *larissa* Sm.) A series standing as *larissa* were all correct. Of three specimens separated as *anguina*, one was this species, and the other two *cervina*; whilst of four specimens doing service for *incurva* Sm., two were *larissa* and

two *vicina*. It may here be remarked that mixtures of this kind were not infrequent in Smith's own collection, when I saw it in 1910.

Mamestra vicina Grt.

Barathra curialis Sm. Mixed with *Mamestra lubens*, to which it bears rather a close resemblance.

Dargida procinctus Grt.

Morrisonia evicta Grt. Standing as *sectilis*, which was probably Smith's error. The var. *vomerina* was correctly named. Holland, Pl. XXIV, pp. 13, 14, are of *evicta*, not *sectilis*, and fig. 14 is var. *vomerina*.

Xylomiges dolosa Grt.

Cardepi (*Mamestra*) *mutata* Dod. One specimen, but with *trifolii* and *chunka* wrongly associated with it, as mentioned under those headings. Sir George Hampson has critically examined my species, and tells me that it belongs to the genus *Cardepi*.

Nephelodes emmedonia Cram. (syn. *minians* Gn.) Dark specimens stood as *violans* Gn., and pale ones as *tertialis* Sm. The latter name is a pure synonym of *emmedonia*. *Violans* is a violaceous form of it.

Leucania unipuncta Harr.

Leucania luteopallens Sm. (= *pallens* Linn., probably). The species stood as *minorata* Sm., which is scarcely recognizable as a variety.

Leucania albilinea Hbn., (syn. *obscurior* Sm.)

Leucania dia Grt. Standing as *megadia* Sm., which is a variation possessing a black basal streak, an evanescent character.

Leucania multilinea Walk.

Leucania commoides Gn.

Leucania phragmitidicola Gn.

Orthodes crenulata Butl.

Orthodes cynica Gn.

Orthodes vecors Gn. Two badly worn specimens, one of them dated July 5th, 1907.

Himella contrahens Walk. The form here seems darker and more even than *infidelis* Dyar, and to be almost typical *contrahens*, though I am not satisfied as to their distinctness.

Crocigrapha normani Grt. One female, May 30th, 1912.

Eriopyga (*Tæniocampa*) *uniformis* Sm. Specimens stood under this name, and others were separated as *peredia* Grt. (= *furfurata* Grt.) and *communis* Dyar. There were none of the last named species in the collection. I am not assured of the distinctness of the other two, but the Manitoba form agrees better with *uniformis* than with true *furfurata*.

Eriopyga oviduca Gn.

Monima (*Tæniocampa*) *hibisci* Gn. (= *alia* Smith, etc., nec Guen.) Specimens stood in three different series, as *pacifica*, *instabilis* and *brucei*.

Monima revicta Morr. (*subterminata* Sm.) Five specimens, and one of *hibisci* wrongly associated with them.

Tricholita signata Walk. Standing correctly, and two specimens with *Mamestra columbia*.

Lithomoia germana Morr.

Graptolitha (*Xylina*) *disposita* Morr. A long and variable series, some of which stood wrongly as *hamina* Grt.

Graptolitha bethunei G. & R.

Graptolitha innominata Sm.

Graptolitha petulca Grt. Two stood with *amanda*, one of them dated Sept. 27th, 1904.

Graptolitha amanda Sm.

Graptolitha fagina Morr. Three specimens.

Graptolitha georgii Grt. Standing correctly, and also as *holocinerea*, *vertina*, *ancilla* and *oregonensis*. All are synonyms of *georgii*, with the doubtful exception of *oregonensis*.

Graptolitha unimoda Lint. Smith redescribed this from Manitoba specimens as *merceda*, though Heath had *tepida* under the latter name. This group of *Xylina* was badly mixed in the collection.

Graptolitha laticinerea Grt. Smith redescribed the species as *winnipeg*, but used to confuse it with *unimoda*. It must be admitted that the group is rather a difficult one.

Graptolitha cinerosa Grt. (syn. *grotei* Riley). Five specimens were found mixed with *laticinerea* and a few *unimoda*. The line between *cinerosa* and *laticinerea* is often very difficult to draw, and I have rarely, if ever, seen a collection in which they appeared to be correctly separated.

Graptolitha (Xylina) antennata Walk.

Graptolitha tepida Grt. Smith described it from Manitoba as *atincta*, creating an exact synonym.

Graptolitha pexata Grt.

Litholomia napæ Morr.

Xylotype (Xylina) capax G. & R. One poor specimen, Sept. 7th, 1905.

Calocampa curvimacula Morr.

Calocampa nuptera Lint.

Calocampa cineritia Grt.

Calocampa thoracica Grt.

Cucullia asteroides Gn. Four specimens. I have a slide of the genitalia of one of them.

Cucullia omissa Dod. Six specimens, three of which I have made cotypes.

Cucullia postera Gn. Standing as *floreæ*.

Cucullia speyeri Lint.

Cucullia intermedia Speyer. Females stood correctly, but males were separated as *cinderella* Sm.

Rancora albicinerea Sm. A specimen of *Cucullia intermedia* stood under this name, but two of *albicinerea* stood apart elsewhere unlabelled.

Asteroscopus borealis Sm. There were no specimens of this very rare species in the collection, though the type was captured near Cartwright. There was, however, a large pencil drawing of the body and right wings, presumably of the type, labelled "Poplar catkins, Long River, Mani., 1884, May 1st."

Bellura obliqua Walk. One pair, agreeing with Holland's figure.

Nonagria subflava Grt.

Tapinostola variana Morr.

(The *Hydræcias* and *Papaipemas* have been determined by Mr. Bird.)

Hydræcia velata Walk.

Hydræcia nictitans Linn. A short series were also separated as *juvenilis* Grt.

Hydræcia immanis Gn.

Hydræcia perobliqua Hamp.

Papaipema rigida Grt.

Papaipema harrisii Grt.

Papaipema purpurifascia G. & R.

Papaipema pterisii Bird.

Papaipema nebris Gn. Two specimens. Holland's figures of *nebris* and var. *nitela* are reversed.

Papaipema helita Strck.

Papaipema frigida Sm., and var. *thalictri* Lyman.

Papaipema humuli Bird. Standing as *circumlucens* Sm.

Papaipema marginidens Gn. Standing as *rutila* Gn.

Pyrrhia cilisca Gn. Two pair. This is the *umbra* of North American collections generally.

Pyrrhia exprimens Walk. Two males and a female. An examination of male genitalia of this and the foregoing, mounted by Mr. Tams, has strengthened my opinion as to the distinctness of *cilisca* and *exprimens*.

Xanthia flavago Fab.

Mesolomia iris Gn.

Trigonophora periculosa Gn. and var. *v-brunneum* Grt.

Cinædia pampina Gn.

Scoliopteryx libatrix Linn.

Enargia (*Cosmia*) *decolor* Walk. (= *paleacea* Sm. non Esp.)

Enargia infumata Grt. (syn. *punctirena* Sm.)

Amathes (*Orthosia*) *bicolorago* Gn. and var. *ferruginoides* Gn.

Amathes verberata Sm.

Amathes puta G. & R. (syn. *curoa* G. & R.) A series as *curoa* and another as *dusca* Sm., which is the same species. This was also very badly mixed up with *Parastichtis discivaria*.

Amathes aggressa Sm. Two females. These two specimens, identified for me by Messrs. Barnes and McDunnough, appeared to be very obviously distinct from *puta*, being both large and pale. Other specimens which I have seen resemble that species much more closely. The difference in the male genitalia points to their being probably distinct.

Amathes inops Grt. A few were under their correct name. Some were mixed with *Tapinostola inquinata*, and scattered about amongst sundry other species.

Agroperina (Orthosia) lineosa Sm. and var. *pendina* Sm.

Agroperina lutosa Andrews. So standing were four of this species and one of *Scopelosoma sidus*. A large number were mixed up with other species, especially with *Euxoa scandens*. A series of *lutosa* and two *lineosa* stood as *inficita* Walk. (A prior name for *belangeri* Morr.)

Agroperina helva Grt.

Parastichtis discivaria Walk. Another badly mixed species.

Scopelosoma tristigmata Grt.

Scopelosoma sidus Gn. Standing as *walkeri*. The two are very difficult to separate, but I am not aware that *walkeri* occurs in Manitoba.

Scopelosoma devia Grt

Glæa inulta Grt.

Epiglæa decliva Grt Holland's figure under this name is probably *signata*.

Homoglæa hircina Morr.

Homoglæa carbonaria Harv. One specimen, Sept. 24th, 1910.

Calymnia orina Gn.

Ipimorpha pleonectusa Grt.

Copablepharon grandis Strk. One female, without date.

Heliothis armiger Hbn.

Heliothis phlogophagus Grt.

Rhodophora florida Gn

Schinia cumatilis Grt.

Melaporphyria oregonica Hy. Edw.

Melicleptria villosa Grt. One female, resembling Alberta specimens which I have identified.

Melicleptria ononis Schiff. (syn. *septentrionalis* Hy. Edw.) One pair.

Plagiomimicus expallidus Grt.

Calpe canadensis Beth.

Panchrysia purpurigera Walk.

Plusia æroides Grt.

Plusia balluca Geyer.

Euchalcia venusta Walk.

Euchalcia contexta Grt. A single specimen was in the collection with no date or label on it of any kind.

Euchalcia putnami Grt.

Euchalcia bimaculata Steph.

Euchalcia biloba. One male, May 22nd, 1911.

Euchalcia californica Spezer. One female, standing as *pseudogamma*, with a specimen of the latter species sent to Heath by the author. It is strange to note the scarcity of *californica* in Southern Manitoba.

Euchalcia precatationis Gn.

Euchalcia brassicæ Riley.

Euchalcia flagellum Walk.

Euchalcia rubidus Ottol. A figure only, probably one of the types, as Cartwright was amongst the localities from which it was described.

Euchalcia ampla Grt.

Euchalcia falcifera Kirby, and var. *simplex* Walk. None of the specimens were very dark.

Abrostola urentis Gn.

Ogdoconta cinereola Gn.

Alletia argillacea Hbn. One specimen, Sept. 30th, 1905, and associated with it, a bodiless worn specimen, probably *Agroperina lutosa*.

Rivula propinqualis Gn.

Erastria albidula Gn.

Erastria carneola Gn.

Erastria includens Walk.

Erastria panatela Sm. One male, without date, standing with *Tapinostola inquenata*.

Galgula partita Gn. A single ♂. Dr. McDunnough said that this was var. *ferruginea*. My notes on *ferruginea* type (♂) say "a pale form, and reddish." It must not be confused with the dark vinous female of this species called *hepara*.

Lithacodia bellicula Hbn.

Xanthoptera semiflava Gn. A splendid series.

Acontia binocula Grt. Standing as *candefacta* Hbn.

Acontia candefacta Hbn. Standing as *erastricides* Gn.

Spragueia tortricina Zell. A good and variable series. Mr. Wallis submitted this species to Mr. Gibson, and he said that it

was "*Fruva modesta*," and the dark form in the series may be *obsoleta*. I possess *tortricina* compared with the type, and have a note saying that *obsoleta* (also type) is probably the same species. Hampson makes *modesta* a dull form of *tortricina*, but he has not seen the type. I feel sure that *tortricina* at least is in the Heath collection.

Homopyralis contracta Walk.

Mycterophora slossoniæ Hulst. Dr. Dyar has found that this is a Noctuid genus.

Drasteria erechtea Cram.

Drasteria crassiuscula Harv. A good series of these two species, and as far as could be judged, fairly well separated. Males are not always separable without reference to the genitalia. Amongst both series were some peculiarly small forms.

Drasteria distincta Neum.

Euclidia cuspidea Hbn.

Melipotis nigrescens G. & R.

Melipotis versabilis Harv.

Syneda hudsonica G. & R.

(The *Catocalas* were determined by Messrs. Barnes and McDunnough.)

Catocala manitoba Beut.

Catocala cratægi Saund.

Catocala abbreviatella Grt., and var. *whitneyi* Dodge.

Catocala coccinata Grt.

Catocala cerogama Gn.

Catocala zoe Berh. Dr. McDunnough says that this is probably a good species, and not a variety of *ilia*.

Catocala parta Gn.

Catocala unijuga Walk., and var. *lucilla* Worthington. This latter is apparently on Mr. Beutenmüller's authority. Dr. McDunnough says that to his knowledge the name *lucilla* has not been published, but that the specimen in question is probably a faded variety of *unijuga*. *Lucilla* is unknown to me. In Smith's Catalogue it stands as a synonym of *unijuga*, apparently on the authority of Hulst. Sir George Hampson treats it as a synonym of *semi-relicta*.

Catocala meskei Grt. One specimen standing as "pura, dark form," and presumably so recorded by Heath.

Catocala briseis Edw.

Catocala faustina Strk. var. *verecunda* Hulst.

Catocala aspasia Strk.

Catocala concumbens Walk.

Catocala luciana Hy. Edw.

Catocala relictæ Walk., and var. *clara* Beut.

Zale horrida Hbn.

Pheocyma lunata Dru. One very badly worn specimen.

Pheocyma minerea Gn. A considerable number under three names; one as *minerea*, the majority under *norda* Sm., which is a synonym, and three as "? *lineosa*."

Pheocyma galbanata Morr. (syn. *lineosa* Sm., nec Walk.) One specimen, standing as *lunifera*.

Pheocyma unilineata Grt.

Thysania zenalia Cram. One specimen of this migrant from the West Indies.

(The doubtful Deltoids were submitted to Messrs. Barnes and McDunnough.)

Epizeuxis lubricalis Hbn. There were large and small specimens, looking rather like two species.

Epizeuxis rotundalis Walk.

Epizeuxis americalis Gn.

Epizeuxis æmula Hbn.

Hormisa absorptalis. Two specimens.

Hormisa bivittata Grt. Two specimens.

Hormisa pupilloris Grt.

Philometra gaosalis Walk.

Philometra hanhami Sm. Agrees with the description.

Chytolita morbidalis Gn. Mixed with *Renia flavipunctalis* Geyer, and *factiosalis* Walk.

Bleptina caradrinalis Gn.

Renia flavipunctalis Geyer.

Palthis angulalis Hbn.

Capis curvata Grt. Two specimens.

Bomolocha bijugalis Walk.

Bomolocha scutellaris Grt.

Bomolocha atomaria Sm. (syn. *chicagonis* Dyar.)

Bomolocha latalba Sm. A long series, including male and female cotypes.

Plathyphena scabra Fab.

Hypena humuli Harr.

Thyatiridæ.

Habrosyne scripta Gosse.

Pseudothyatira cymatophoroides Gn., and var. *expultrix* Grt.

Contrary to my former belief, evidence seems to point to the probability of these being forms of one species.

Euthyatira pudens Gn.

Notodontidæ.

Melalopha apicalis Walk.

Melalopha strigosa Grt. One specimen.

Melalopha albosigma Fitch.

Melalopha brucei Hy. Edw.

Datana ministra Dru.

Hyperæschra stragula Grt.

Hyperæschra georgica H. S. One male without date, identified for Heath by Dr. Dyar. It is much paler than Holland's figure, and the transverse lines contrast. Mr. Criddle's collection also contained a specimen of this very rare species.

Notodonta simplaria Græf. One specimen.

Odontosia elegans Strck.

Pheosia dimidiata H. S.

Lophodonta ferruginea Pack. One specimen, June 23rd, 1911.

It is like Holland's figure, but darker and more even.

Lophodonta angulosa S. & A.

Nadata gibbosa S. & A.

Nerice bidentata Walk.

Symmerista albifrons S. & A. Two specimens, June.

Dasylophia anguina S. & A.

Heterocampa bilineata Pack. One male, June 22nd, 1901. Near Holland's figure, but even, greyish.

Ianassa lignicola Walk. Two, July 22nd, 23rd, 1905.

Schizura ipomææ Daub. Two females so standing. Var. *cinereofrons* Pack. A series of males stood thus, and Mr. Wallis informs me that the form is so named in his collection.

Schizura concinna S. & A.

Schizura semirufescens Walk., probably var. *perangulata* Hy Edw.

Schizura unicornis S. & A.

Schizura badia Pack.

Schizura leptinoides Grt.

Cerura scitisscripta Walk., var. *multiscripta* Riley.

Cerura occidentalis Lint.

Harpyia cinerea Walk.

Harpyia scolopendrina Bdv. As figured by Holland.

Gluphisia septentrionalis Walk.

Gluphisia sp. Two males, one dated June 3rd, 1905, apparently distinct from anything else known to me, but near *septentrionalis*. I compared a Winnipeg specimen with Packard's figures some years ago, and noted that it resembled *wrightii* as there figured, but it cannot be *wrightii*. I submitted a specimen to Messrs. Barnes and McDunnough, who said it was "nearest *lintneri* which we have from the same general region." It certainly is not *lintneri*.

Liparidæ.

Hemerocampa leucostigma S. & A.

Hemerocampa definita Pack. A series, agreeing with Holland's figure.

Alone vagans B. & McD., var. *grisea* B. & McD. This is the species which has always been widely known as *plagiata* Walk., but that species is the same as *definita* Pack. The form is normally brown or grey-brown, but some of the Heath specimens were very blackish grey.

Lasiocampidæ.

Malacosoma fragilis Stretch. The species was so named in the collection. I am not sure that *americana*, *fragilis* and *pluvialis* are always separable except by larval characters.

Platypterygidæ.

Oreta rosea Walk.

Drepana arcuata Walk.

Falcaria bilineata Walk.



PHALONIA SPARTINANA B. & McD.

(See p. 96)

A FEW NOTES ON THE LIFE HISTORY OF PHALONIA SPARTINANA.

BY C. N. AINSLIE, U. S. BUREAU OF ENTOMOLOGY.

This moth, recently described in the pages of the Canadian Entomologist* by Drs. Barnes and McDunnough, has been but once or twice taken in the open by the writer, but a number of adults have been reared in captivity at Elk Point, South Dakota. The species appears to cover a wide range of territory, for the larvæ have been found by the writer from the Canadian boundary to Southern Iowa, in fact the host grass, wherever it grows, seems to be infested by this insect.

The host grass, *Spartina michauxiana*, upon which the larvæ feed, occurs on low land and in swampy places, making a very rank growth. At times it attains a height of eight or nine feet, with a lower stem as large as a lead pencil or even larger. It is known as rope grass, or, locally, as red gut. In Eastern South Dakota the larvæ of this moth invade this grass very extensively, the infestation being as great in some places as 50%. The presence of the larvæ is shown, when the grass stem is split, by a fine, free, granular frass that loosely fills the gallery made by the borer.

The Egg.

The egg of the moth is of the disk type, so usual among the Tortricids. It is an irregular, flattened, disk-like form, ornamented by coarsely dotted radiating lines. A very few of these eggs have been seen, attached to the glumes of the *Spartina* head, the eggs being laid in ribbons of four or five, fastened together by their edges. The diameter of these disks is about .6 mm.

The Larva.

As soon as it leaves the egg the larva appears to feed first on the contents of the *Spartina* glumes, boring into one after another and devouring the anthers and stigmas of the undeveloped florets. After feeding for a week or more in this manner, it moves down to the stem, just below the base of the head and bores a circular opening into the stem after first spinning a slight silken shelter for itself for protection before it gets fairly inside. The opening it makes is about .75 mm. in diameter.

*Vol. XLVIII, 1916, p. 144.
March, 1917

One of the peculiar features of this species is the prodigality with which it sacrifices its individuals when very young. The young larvæ that feed in the glumes are to be numbered by the dozens in some of the infested heads, yet as far as the study of the species can determine, but one of these can survive in the course of the season. Several often find their way into the stem centre by separate openings, but invariably only one of these appears to survive. Several times one larva in a stem has been found feeding on a half-eaten rival. And it is certain that when winter comes there is but a single individual within each infested stem. Some explanation for this apparently useless expenditure of life may be discovered during future studies of this species, but at present it is an enigma. The reason why a single larva occupies an entire stem is clear, since a single stem affords nourishments for but one borer and self preservation compels the destruction of all competitors by the individual possessing the most vigour or the commanding position.

The parenchyma in the upper stem is unbroken and the gallery there is continuous. Farther down, the larva occasionally takes advantage of lesions in the parenchyma and passes sometimes for several inches with no sign of a mine. The nodes are, of course, solid and these are of necessity bored. Near the base of the stem there are few lesions, the larva is much larger, and the gallery is continuous.

The larva enters the stem during August, and by the middle of October, its progress depending upon the character of the season, it usually reaches the stem base. From lack of vitality or for some other reason a few of the larvæ always fail to reach the base before winter, and many of these belated individuals perish during the winter. Those in the hibernation chamber underground appear to survive almost without exception. This chamber is merely the portion of the gallery at the very base of the stem. It is cleared of frass, often but not always lined with delicate, transparent silk, and here the larva hibernates until the middle of the following May. For two years the writer supposed this was also the pupation chamber, but before the end of May the stems are for the most part vacated, the guests disappearing through an opening eaten through the stem about ground level. A fortunate discovery solved the

mystery. It was learned that when the larvæ leave the hibernation cell they move at once to the fresh growth of the spring, the young grass shoots being then perhaps eighteen inches tall. These shoots are entered near their upper end, where the long blades coalesce into a spongy stem, and the larvæ of the previous year begin once more to feed upon the fresh and succulent interior of this growing sprout. Boring downward nearly to the ground they reach maturity, become sluggish, line a portion of frass-free gallery with a delicate silken tissue and pupate here some time early in July. At the time of pupation the larva measures from 15 mm. to 18 mm. in length, and is a half-transparent, watery green colour with sometimes a yellowish tinge.

The Pupa.

The pupa is a chestnut brown and measures about 12 mm. in length by 3 mm. in diameter. During emergence the moth drags the pupal envelope almost completely from the stem.

The Adult.

The first adult to be reared in captivity appeared in a cage July 19th, 1915. These moths continued to emerge during July and well into August, the last one being taken about August 15th. Several adults were captured on July 20th, 1916, in the vicinity of Spartina, near Sergeant Bluff, Iowa. In captivity the adults are good hidiers, being difficult to find in a cage until they move, and they only move when much annoyed. They stand on grass blades or other perch with the head pointing upwards and will sidestep when disturbed, flying only as a last resort. In the open they take to wing with a quick, baffling flight which carries them a few feet. They make a dash for shelter, alight on a leaf or twig and whirl to the rear of their perch as quick as a flash. After one such flight they are easily dislodged again, and are not readily taken.

Beyond this note nothing is known of the habits of the adults, but they are evidently nocturnal fliers, judging from sundry observations.

Oviposition doubtless occurs soon after the emergence of the moths and studies of the Spartina heads indicate that the period of oviposition covers several weeks. The same seasonal causes that would delay the emergence of the moths would also tend to retard the heading out of the Spartina. A supply of glumes in

the proper condition for food for the newly hatched larvæ naturally precedes the hatching of the eggs, and the time of oviposition must coincide with or very closely follow the emergence of the *Spartina* heads.

The antennæ of the moth are, when at rest, carried under the wing, closely appressed to the side of the thorax and reach to about the third abdominal segment. The eyes are in some lights a greenish brown.

No parasites have as yet been reared from *Phalonia spartinana*.

EXPLANATION OF PLATE VI.

Upper right fig.—Adult and empty chrysalids of *Phalonia spartinana*, showing extension of pupa case during emergence ($\times 2\frac{2}{3}$, nearly).

Upper left fig.—Pupa of *P. spartinana* in situ in stem of *Spartina michauxiana* ($\times 3\frac{1}{3}$, nearly).

Lower fig.—Larvæ of *P. spartinana* in situ in lower stem of *Spartina michauxiana* ($\times 3$).

THE ODONATA OF THE RED DEER DISTRICT, ALBERTA.

BY F. C. WHITEHOUSE, RED DEER, ALTA.

While the careful collecting of Dragonflies in the Red Deer District for the past two seasons has failed to produce any notable surprises, or, in fact, a very lengthy list of species, I nevertheless feel that it is not out of place to publish my observations in a district that, so far as this order is concerned, has never been worked before. It is, of course, altogether likely that thorough collecting over a number of years would tend to lengthen the list, but this, in my opinion, would not be to any very appreciable extent.

Red Deer (Canadian zone) is situated on the Red Deer River about half-way between Calgary and Edmonton, and has an altitude of 2,818 feet. The district is well treed with spruce, aspen (*Populus tremuloides*) and balsam-poplar (*Populus balsamifera*). Bordering on the city is a body of water, twenty acres in area, known as Gaetz Lake, and the Waskasoo Creek flows through the town site.

March, 1917

I am much indebted to Dr. E. M. Walker for identifying specimens and giving me much useful advice, and also in looking over this manuscript.

To Mr. C. B. Horsbrugh my sincere thanks are due for practical assistance in the collection of specimens. In this gentleman's ornithological studies he has ranged the district "far and often," and, owing to this careful scouting, the appearance of "something new" has been almost instantly noted.

The list is arranged according to Muttkowski's catalogue of the Odonata of North America, and the *second* numbers refer to pages.

Unless otherwise stated all dates apply to 1916.

Cœnagrionidæ.

LESTINÆ.

1-37 *Lestes congener* Hagen.

Teneral appeared Aug. 4th, and by Aug. 27 adults were flying in numbers. I took specimens as late as Sept. 24.

A common insect here.

2-37 *Lestes disjunctus* Selys.

July 8, 1 ♂ and 2 ♀ teneral and others observed. July 13-16, numbers flying; some nearly adult and teneral. July 22, many adults. August 27, still on the wing. Last date, a single belated ♂, Sept. 14.

Very common.

3-39 *Lestes uncatus* Kirby.

First appearance July 2, a ♂ and 2 ♀ teneral, and other teneral seen by a run of still water behind Allen's House. July 5, a ♂.

I do not believe *uncatus* is as scarce as my scanty captures would indicate, but it is certainly the least common *Lestes* in this district. I took an adult ♀ in 1915, which was the first record for Alberta.

4-40 *Lestes unguiculatus* Hagen.

I failed to note the actual first appearance of teneral. On July 19 I took 5 adult ♂s, and a pair in cop., and by July 22 many adults were on the wing. The insect was flying in numbers at Blackfalds, August 19-25, soon after which the flight apparently ceased. A common insect.

CÆNAGRIONINÆ.

5-55 *Enallagma calverti* Morse.

A number of my 1915 captures were labeled by Dr. Walker "♂ *calverti*" and "♀ *calverti* or *cyathigerum*." The insects seem very similar in appearance, season and habits, but the ♂s appear to differ constantly in the form of the superior appendages. My dates read: teneral ♂s June 7; adult ♂s June 24, and a pair, in alcohol, July 2; both fully adult. Another pair taken in cop., July 23. Common.

6-57 *Enallagma cyathigerum* Charpentier.

On the wing early in June and adult by 24th of that month. I have pairs taken in cop., June 25, July 15, July 16. By 4th week in July principal flight was over, but belated individuals appeared later. I took a ♂ as late as August 27. Common.

7-() *Cænagrion angulatum* E. M. Walker.

On July 4 I took a ♂, fully coloured, at Gaetz Lake, flying with *C. resolutum*. Innisfail, July 6, hundreds flying with *resolutum* by stagnant slough. Red Deer, July 8, Gaetz Lake, ♂ and ♀; July 13, ♂ and ♀; July 19, 2 ♂s; July 22, a ♂. A stagnant slough rather than a considerable body of clear water appears to be the truer habitat of the nymph—which is at present unknown. It was useless to work the slough on the occasion mentioned as heavy rains had fallen. The slough was flooded and all exuviae would have been washed from the reeds. New to the Alberta list.

8-66 *Cænagrion resolutum* Hagen.

First appearance 1916, May 26, teners of both sexes. By June 15 in full colour. Numbers in cop., June 25, July 4, July 16, July 19. Shortly after the last date the flight ceased. Common. Gaetz Lake, Red Deer, and Innisfail near stagnant slough.

Æshnidæ.

GOMPHINÆ.

9-85 *Ophiogomphus severus* Hagen.

In 1915 I took a number Aug. 30 to Sept. 7, but more thorough collecting in 1916 proved that *severus* appears in mid-July. My dates are July 13, a teneral ♂; July 14, a ♂; July 17, ♀; July 18, ♀; Aug. 4, 3 ♂s—one a teneral; Aug. 5, ♂ and ♀; Aug. 6, a

number; Aug. 19, a ♀; Aug. 26 Mr. Horsbrugh saw three. Last date Sept. 10, a young ♂.

This dragonfly frequents sandy roads near the river, and rests on the soil frequently. The beautiful light green of the teneral is lost in dried or even alcoholic specimens.

ÆSHNINÆ.

10-110 *Æshna eremita* Scudder.

Nordegg (altitude 4,500 ft., 120 miles west), Aug. 10, a ♂; Sylvan Lake (fifteen miles west), Aug. 14, a ♂; Blackfalds (nine miles north), Aug. 19-25, 3 ♂s; Red Deer, Aug., 24, 4 ♂s; Aug. 27, 2 ♂ and a ♀; Aug. 29, 2 ♀s; Sept. 2, 2 ♂s and 2 ♀s; a number flying in cop., Sept. 9. Last date Sept. 16, a ♂. Appears to be widespread and fairly common. Adult ♀s dimorphic, being blue and black like male, or yellow and brown.

11-112 *Æshna interrupta lineata* E. M. Walker.

First flight of teneral July 1. By July 13 some taken almost adult. July 16 took ♂ and ♀ teneral at Gaetz Lake with their exuviae. The latter half July, all August and first three weeks Sept., *lineata* swarms everywhere, and up to the 4th week in August (when *A. eremita* appears) the ratio of *lineata* to all other *Æshna* would be at least 25 to 1. Frost at night, Oct. 1 to 7; Oct. 8, a ♀ teneral.

Lateral thoracic bands subject to great variation. I have taken ♂s with the upper two-thirds of the second band absent; excepting light terminal spots, and others with both bands *slightly* interrupted.

12-111 *Æshna juncea* Linné.

A ♀ teneral in a glade close to southeast corner Gaetz Lake, August 5. There is nothing extraordinary in this record, for *juncea* has been taken in Alberta previously and might well be expected to occur here, but what seems inexplicable is that careful collecting in the same locality failed to produce others.

13-114 *Æshna sitchensis* Hagen.

Red Deer, a teneral ♂, Aug. 2, and ♂, Aug. 11. Blackfalds (9 miles north), Aug. 21, ♀; Aug. 22, ♂; Aug. 23, a ♀ and 2 ♂s. Last date, Red Deer, Sept. 10, a worn ♂.

On Aug. 6 I searched the reeds at Gaetz Lake for nymphs

but found *A. lineata* only. At Blackfalds, Aug. 23, I took the specimens noted, and saw others (some of which were in cop.) flying over a large muskeg. I incline strongly to the opinion that the true breeding ground of this northern insect is muskeg, which may account for the nymph being still unknown.

14-114 *Æshna umbrosa* E. M. Walker.

Among my 1915 captures Dr. Walker named one *umbrosa*—a ♀. Unfortunately I failed to record data, though it was certainly taken in the Red River District. I naturally expected to take specimens during the past season, but of the dozens of *Æshna* netted for examination, not one *umbrosa*! New to Alberta list, 1915.

Libellulidæ.

CORDULINÆ.

15-128 *Cordulia shurtledgei* Scudder.

Teneral appeared June 6, both ♂ and ♀; June 8, 6 ♂s and 6 ♀s; June 11, numbers flying; June 17-24, a few still on the wing; July 1, a ♀; July 5, a ♂ and a ♀.

This handsome dragonfly appears to have a very limited season. Practically all the specimens were taken in the sun-lit glades northeast of Gaetz Lake, and I took exuviae in the reeds. New to Alberta list.

16-129 *Somatochlora hudsonica* Hagen.*

I took this insect at one place only; and for a very limited period, viz., flying over a small "run" of still water behind Allen's house, at north end of Gaetz Lake. July 1, 4 ♂s and 1 ♀; July 2, 1 ♂; July 8, 1 ♂; July 9 saw several and took a ♂.

The males never appeared to rest, but the only ♀ taken was while temporarily at rest on a low bush. I conclude the insects were bred in the "run" over which they flew, but when first observed they were adult. Next June I should be able to obtain the nymph, which is at present unknown.

*I sent drawings of the male abdominal appendages of one of this series to Mr. C. H. Kennedy, who wrote me that it was the same as the *S. hudsonica* in the Hagen collection, M. C. Z., Cambridge, Mass. This is not the species figured by Martin as *hudsonica* in Cat. Coll. Selys, XVII, p. 27.—E. M. Walker.

LIBELLULINÆ.

17-139 *Libellula quadrimaculata* Linné.

Tenerals appeared June 8, 1 ♂. On June 11 I saw three and took a ♀; June 15, took 2 ♂s and a ♀; June 17, numbers flying; June 18, reeds at Gaetz Lake full of tenerals with exuviae; June 25, many on the wing; July 5, 2 ♂s; July 9, "none;" July 13, "none;" July 15, 1 ♂; July 16, ♀ (ovipositing); July 23, a few ovipositing; July 29, 2; Aug. 5, a worn ♀; Aug. 6, several very worn ♀s.

It will be noted that while *C. shurtleffi* and *L. quadrimaculata* appear at the same time, the season of the latter is two months, to one month of the former. I once observed a ♀ ovipositing with a mate hovering by. Twice they went into copula for short periods between spells of ovipositing—which, however, she performed alone. New to Alberta list.

18-160 *Sympetrum corruptum* Hagen.

A strangely rare insect considering the length of its season, as shown by the dates of the only five specimens taken in this district in two years, viz., June 20, 1916, Sylvan Lake (Horsbrugh), a ♂ nearly adult; July 8, 1916, Red Deer, a ♂; Aug. 5, 1916, Red Deer, a ♀; mid-Aug., 1915, at Blackfalds, a ♀; Sept. 4, 1915, Red Deer, a ♀ teneral.

Assuming that June 20th specimens had been on the wing since June 15, and the Sept. 4 teneral would have lived until Sept. 15, it would give a season of three months. Four of my captives were taken on roads, and the fifth on a railway grade.

19-161 *Sympetrum costiferum* Hagen.

Aug. 5, a ♀; Aug. 6, a ♀; Aug. 13, many flying alone and in cop.; Aug. 29 to Sept. 24, "numbers," and fresh tenerals. Last date Sept. 30.

Costiferum is probably rather less numerous than either *S. rubicundulum* or *S. scoticum*, but very common nevertheless. It is the last of the genus to appear, but I fancy it may have been on the wing slightly earlier than my first date. New to Alberta list.

20-162 *Sympetrum obtrusum* Hagen.

Dr. Walker named one of my 1915 captives *obtrusum*, and it possibly occurs here in fair numbers. I must confess, however, that I find difficulty in satisfying myself positively by the genital

organs, that specimens which might be *obtrusum* from general appearance (olive green ♀ colouration, white faces, etc.) are anything but *rubicundulum*.

21-163 *Sympetrum rubicundulum decisum* Hagen.

First appearance, 1916, July 2, 2 ♀ teneral; July 4, a ♀; July 5, 1 ♂ and 3 ♀s—the ♂ showing red; July 8, "a number," and by July 13, common everywhere. Observed in cop., July 16. The main flight of *rubicundulum* was practically over by the end of August, but belated individuals to mid-September.

Yellow-winged ♀s are quite common. I have specimens July 5 to Sept. 10. The colouration varies from light yellow to the brown of a nicotine stain.

22-163 *Sympetrum scoticum* Donovan.

July 17, first flight of teneral; July 23, "numbers." Teneral still appearing. Aug. 24, (on which date I took a teneral with exuvia) but by this time many of the earlier flight were black adults. Sept. 2, adults flying in hundreds, and continued during month. Last date Oct. 12.

Scoticum is a very common insect in this district. Ovipositing is performed by rapidly dipping the tip of abdomen in shallow water in the reeds. During the operation the male retains hold by appendages and appears to take an intelligent interest—the pair moving in perfect accord from one patch of open water to another. I have never seen ovipositing performed alone.

23-166 *Leucorrhinia borealis* Hagen.

The first flight of teneral appeared May 26, and they continued emerging until mid-June, by which time the early insects were adults, and flying in hundreds. By the end of June the numbers had much decreased, but belated individuals dragged well into July—my last record being July 20, 2 ♀s. Mr. Horsbrugh took a teneral at Camrose, May 19. Adult males are blood-red, and old females also take a reddish tinge. Mid-June I took at Gaetz Lake an exuvia with teneral, and a number of exuviae without. The nymph was previously unknown. The insect selects an average height of four or five inches from the water to transform.

24-166 *Leucorrhinia glacialis* Hagen

On July 5, Mr. Horsbrugh took for me at a slough north, across the river, a number of what at first glance appeared to be

L. proxima—which insect we had been taking for the previous ten days. A closer examination of the specimens, however, failed to show any trace of a spot on segment 7, and they were later forwarded "*glacialis?*" to Dr. Walker for determination. This diagnosis he has confirmed.

From my *proxima* dates I judge the season of the allied species to be almost, if not quite, identical—a point well worth further investigation next year. New to Alberta list.

25-166 *Leucorrhinia hudsonica* Selys.

Tenerals appeared with *L. borealis* May 26, and its season is almost identical. By June 17 males are adult and red, and females reddish. The flight wanes in early July—my final records being as follows: July 2, red ♂; July 4, a teneral ♀; July 5, several pairs in cop.; July 9, saw one; July 13, "none;" July 18, a worn ♀; July 29, a young ♂; Aug. 1, a ♂, red and worn.

In June, *hudsonica* is very common, but possibly rather less so than *borealis*, which it closely resembles in everything except size. I took exuviae rather closer to the water than *borealis* selects.

26-167 *Leucorrhinia intacta* Hagen.

On June 24 I took two young ♂s, the twin-spot on segment 7 being bright yellow. July 14, a ♀; July 15, 3 ♀s; July 20, a fine adult ♀.

The above were my total captives. So *intacta* is clearly not common—in fact rather rare. It is also the latest of the genus to appear, being a month behind *borealis* and *hudsonica* and a week behind *proxima* (and *glacialis?*). From my dates it is obvious that for several weeks—say June 24 to 3rd week July—all five *Leucorrhinia* are on the wing together. One of the ♀s taken on July 15, has wings heavily clouded with dirty brown. New to Alberta list.

27-167 *Leucorrhinia proxima* Calvert.

First appearance June 17 when I took a teneral with exuvia, and another, a ♂, next day. June 24, took 2 ♂s, already showing red markings, and a pair in cop., June 25. July 5, several; July 6, 1 ♂; July 23, 2 old ♂s.

Proxima is far less common than *borealis* and *hudsonica* and appears about three weeks later. The nymph was previously unknown. New to Alberta list.

PLAGIODERA VERSICOLORA LAICH.—AN IMPORTED
POPLAR AND WILLOW PEST.

BY HARRY B. WEISS AND EDGAR L. DICKERSON,* NEW BRUNSWICK, N.J.

For the past three years the writers have noticed this small, metallic blue beetle infesting poplars in a nursery at Irvington, near Newark, N.J., and since it was first noted at Irvington, it has been observed in several other localities. Mr. Charles Schaeffer (Journal N. Y. Ent. Soc., Dec., 1915) cites several collectors who found it on Staten Island, and Mr. William T. Davis (Ent. News., Mar., 1916) also records it from Staten Island; Mr. George Greene, of Philadelphia, states that he found it at Clifton, Passaic County, N.J., in September, 1915, while the writers noted it in 1915 at Arlington, N.J., and Elizabeth, N.J., as well as Irvington, (Can. Ent., March, 1916, and Ent. News, April, 1916). During the past season—1916—it was also observed at Secaucus, Red Bank and South Paterson. At the latter place the species was found very abundant on willow.

The insect is a European species, and according to Mr. E. A. Schwarz, of Washington, was described by J. N. von Laichartig in Verzeichniss und Beschreibung der Zyroles Insecten, 1781–1784, under the name *versicolora*, which is an older name for the common European *P. armorica* of Fabricius. It is interesting to note in passing that Fabricius (Syst. Ent., p. 103) records *P. armorica* as occurring on *Ranunculus aquatilis* and *flammula*, which looks as if *P. armorica* Fabr. might be a different species, unless perchance the insects fed on willow near water and dropped on the *Ranunculi* from which they were collected. There is further synonymy indicated in the various European records, but that need not be discussed here.

In New Jersey the species has been noted by the writers in greatest numbers at Irvington, in a nursery on poplar and at South Paterson on willow, and the following observations were made at these places, principally at the former.

The beetles came from hibernation in late April or early May, and after feeding began oviposition in early May and continued through the greater part of that month. By early June the adults

*The arrangement of the authors' names has no significance, and indicates neither seniority nor precedence.

March, 1917

of this brood had apparently disappeared and all eggs had hatched. The first adults developing from this brood of eggs were noted June 10, and they continued to develop until the early part of July. The first eggs were deposited by the second brood of beetles about July first and oviposition continued until the early part of August. The adults developing from this brood of eggs began to appear in the latter part of July and continued to develop until late August, after which time, after feeding and copulating, they disappeared from the plants, having gone into hibernation.

Hibernation, according to Messrs. Leng and Davis occurs under the loose bark or in crevices in the bark, as they have found them abundantly in such situations on Staten Island. Mr. Leng states that while collecting *Parnidæ* in a pond at Bull's Head, Staten Island, he picked up a piece of willow bark in the water and found several specimens of this species attached to it.

It will thus be seen that there were three broods of beetles during the season, a hibernating brood which appeared in spring and continued in evidence during May, a second brood which began to be in evidence about June 10 and continued to appear until well along in July, by which time the third brood of beetles had begun to mature, and this brood continued in evidence until late August or early September. Thus there were two complete broods of insects in addition to the hibernating beetles. Owing to the fact that the insects apparently lived for some time after maturing, and that the period of oviposition of a given brood extended for some time, with a resulting irregularity in development, there was more or less overlapping of the broods.

It will also be noted from the foregoing record that it required about a month's time for the insects to mature, but this will probably vary a few days one way or the other depending upon conditions of temperature, food, etc. The length of the egg stage varied from three to five days, and the early stages of the larvæ were observed to occupy about the same length of time, while the period of pupation consumed two to three days.

The eggs of this species are laid in somewhat irregular masses, more or less circular or oval in outline and, almost without exception, on the underside of the leaves. Usually only one mass occurs on a leaf but occasionally there may be two, and they are situated

on either side of the midrib near the centre of the leaf. The individual egg is lemon yellow in colour with an apparently smooth surface. It is elliptical or narrowly oval in outline with broadly rounded extremities and measures 0.95 mm. long by 0.45 mm.—0.55 mm. broad. Each egg is attached to the leaf surface at one of its extremities and inclined usually at an angle of 30 degrees. At the attached end there is a thin, irregularly disc-shaped expanse of material which fastens the egg to the leaf surface. A number of egg masses were observed and the numbers of eggs in 22 masses were counted with the following results:

Maximum number.....	30
Minimum ".....	12
Average ".....	19+

Two other unusually small masses were noted which contained five and seven eggs respectively.

As the egg matures, the three pairs of dark spots on the thoracic dorsal surface and the dark spots on the abdominal, dorsal and lateral surfaces of the embryonic larva show distinctly through the egg shell. Previous to the emergence of the larva the shell of the egg splits along the lateral surface from the apical end half way, or slightly more, to the base and the larva gradually works its way through this opening. When the larva first emerges, it is dirty white in colour but changes very rapidly on exposure and soon is dark in appearance.

Five larval stages were observed as follows.—*First stage*: recently emerged larva; body elongate tapering posteriorly; general body colour dirty white; head, and dorsal and lateral surfaces of prothorax black, legs and body at outer side of legs dark brown; meso- and metathorax, each with a pair of dorsal black spots and single dorsolateral tubercles. Each abdominal segment marked dark brown as follows: a pair of prominent dorsal spots, a pair of lateral prominent spots, with a smaller dot more or less connecting them, three less prominent transverse ventral spots forming a broken line. On the posterior abdominal segments the dorsal and lateral spots are connected, forming longitudinal bands. Dark spots on dorsal and lateral surfaces bearing one or more fine, comparatively long hairs and the latter also noted on head and thorax. Width of head 0.3 mm.; length of body 0.9 mm. *Second stage*:

somewhat similar to 1st stage, general body colour yellowish brown, dark spots on dorsal surface forming more or less longitudinal lines. Thoracic tubercles more prominent, and two lateral rows of abdominal spots becoming tubercles and dorsal spots on abdomen becoming slight tubercles. Hairy condition of larvæ slightly more pronounced. Width of head 0.4 mm.; length of body 1.7 mm. *Third stage*: similar to second stage save that the colour, with the exception of the legs, is darker, so that the dorsal surface has a brownish appearance with a light, medial dorsal line on the thorax. Tubercles more prominent and slightly roughened. Width of head 0.5 mm.; length of body 2.5 mm. *Fourth stage*, similar to third stage, save that tubercles and colour are slightly more pronounced. Width of head 0.7 mm.; length of body 3 mm. *Fifth stage*: body elongate, tapering at posterior extremity; margins of prothorax, medial dorsal line of thorax and under surface, yellowish brown. Head shining black and bearing several long setæ; front and vertex depressed; prothorax with most of dorsal surface shining, dark brown, lighter medially and laterally; bearing a few setæ on lateral margins; mesothorax brown, lighter medially, on either side of which are two shining, dark brown spots; lateral margin of dorsum has a prominent, dark brown tubercle with two dark brown, shining spots posterior to it and two below it; metathorax similar to mesothorax; abdomen brown, a double row of dark spots on the dorsum, a double row of shining, dark brown tubercles on each side with a single row of dark brown spots between them; under surface of abdomen with five rows of brownish spots, the three median ones lighter than the others; legs shining black; anus surrounded with a prominent, yellowish, fleshy, circular, sucker-like disc. Width of head 0.8 mm.; length of body 5.00 mm.

The tubercles noted on the sides of the thorax and abdomen contain reversible hypodermal glands which are operated when the larvæ is irritated, even in the recently emerged ones. The larvæ of *Plagiodera* do not respond as readily as do those of *Lina scripta* Fab. which also bear such glands. On the latter species there is a minute drop of liquid exuded which is not the case in *Plagiodera* and the odor is much more pungent.

The sucker-like disc at the anal end is used by the larva in walking. Even in the recently hatched larva this disc is well de-

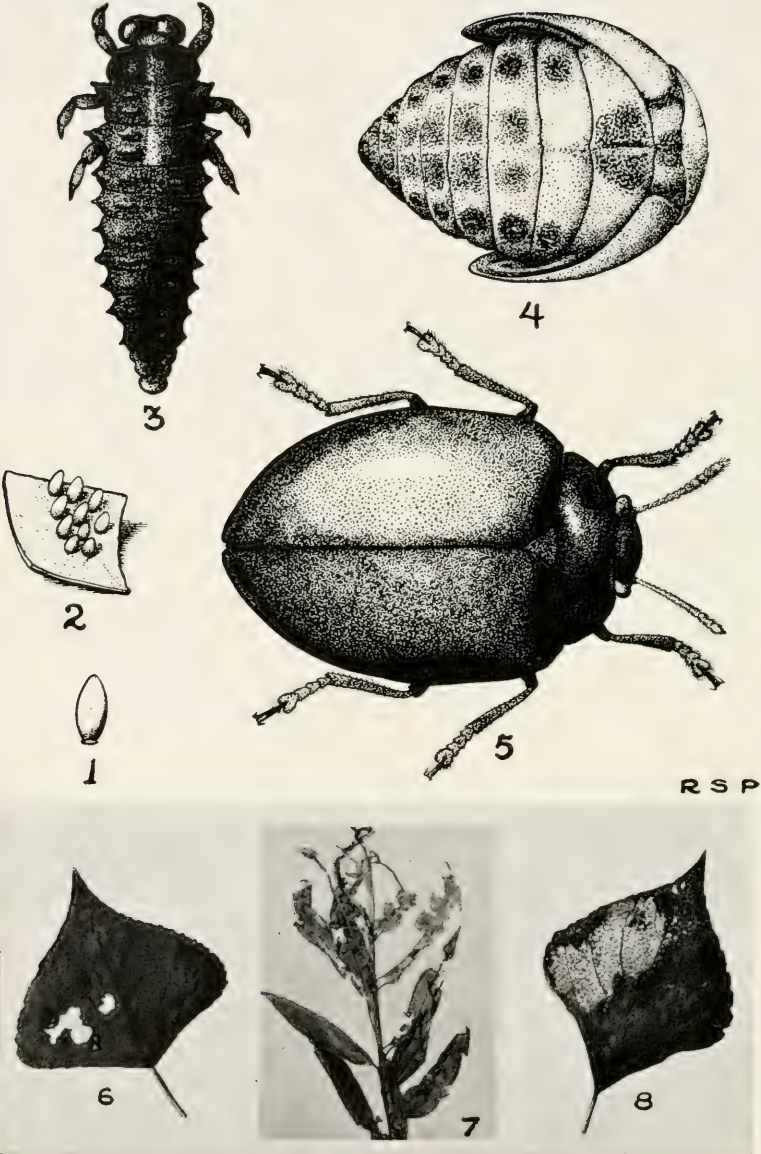
veloped and is quite apparent while the larva is emerging from the egg. It is the principal means of attachment for the newly hatched larva, which is able to hold much more firmly with it than with the legs.

In feeding, the young larvæ are gregarious as a rule and frequently may be observed arranged in the form of a circle or arc with the heads pointed outward. Larval groups of 10, 13, 11 and 16 were thus observed. Later the larvæ spread and usually feed singly. They are found as a rule on the under surface of the leaf but in confinement, and in shady places they were observed sometimes feeding on the upper surface. In feeding, only the epidermis is eaten, and this is in contrast with the adult which consumes all the tissue. At times there did not appear to be as many young larvæ in a group as one would expect from the number of eggs in a mass, and this may be explained by the fact that recently emerged larvæ were observed feeding on eggs which had not yet hatched; three were feeding on one egg, two on another, and two others on one each.

When full grown the larva attaches itself to the leaf, usually the under surface, by means of the sucker-like disc at the anal extremity, and changes to the pupa which rests with its posterior end within the cast skin of the larva from which it could be pulled with little effort. This stage was found to cover a period of two to three days.

The pupa is yellowish brown in colour; meso- and metathorax dark at centre; margin of wing-pads dark; abdomen with a row of broad dark spots on either side of centre, giving the effect of a light, medial, dorsal line; beyond these is a second row of broad, dark-spots near the lateral margin. Length 4 mm.; width 2.5 mm.

Certain pupæ were noted which did not rest close to the leaf surface and upon examination these were found to be parasitized. These pupæ were in a more erect position and it was noted that the anterior ventral surface was more or less broken, exposing from two to four parasitic larvæ or pupæ. Parasites bred from such specimens were kindly determined for us by Mr. Girault, of the Bureau of Entomology, as *Celopisthia rotundiventris* Girault and *Pleurotropis tarsalis* Ashmead, and judging from the condition of the specimens when they were bred, the former is a primary parasite



PLAGIODERA VERSICOLORA LAICH.

(See p. 109)

and the latter a hyperparasite. A number of parasitized pupæ were noted but they were not evidently abundant enough during the past season to form any appreciable check on the insect.

At Paterson, N.J., a number of rather small pupæ were noted. As they were late in developing and undersized it was thought that development might have been affected by parasitism. This proved, however, not to be the case, as beetles were reared from practically all that were collected.

In addition to the parasites a predaceous bug was observed attacking this insect. An adult beetle was found with three nymphs of a species of Heteroptera attached to it. One had the lancets of the beak inserted at the left eye, a second at the tibio-femoral articulation of the left posterior leg, and a third between the last and the preceding ventral segment. At other times dead larvæ were noted and it may be that these also had been attacked by a similar predaceous species.

Owing to the fact that *Lina scripta* Fab. is found associated with this species it is interesting to note some differences between the two. Differences in the glands occurring in the larvæ have already been mentioned, but the larvæ also differ in that *L. scripta* Fab. is somewhat darker than *P. versicolora* and of course attains a larger size. The resulting pupa is also larger than that of *P. versicolora* and hangs from the lower surface of the leaf, attached only at the anal end of the body. The eggs of *L. scripta* Fab. are somewhat similar but the mass is somewhat larger and composed of a larger number of eggs, 60 to 70 having been observed in some masses, while the individual egg is larger and of a light lemon-yellow colour.

EXPLANATION OF PLATE VII.

- Fig. 1. Egg.
- Fig. 2. Small egg mass.
- Fig. 3. Fifth stage larva.
- Fig. 4. Dorsal view of pupa with wing-pads slightly extended.
- Fig. 5. Adult, *Plagiodera versicolora*.
- Fig. 6. Lombardy poplar leaf, showing beetle feeding. (Photo by H. Hornig.)
- Fig. 7. Willow foliage injured by beetles and larvæ.
- Fig. 8. Lombardy poplar leaf, showing larvæ feeding. (Photo by H. Hornig.)

TWO NEW GENERA OF NORTH AMERICAN
ENTEDONINÆ (CHALCID-FLIES).

BY A. A. GIRAULT, GLENNDALE, MD.

Elachertodomyia, new genus.*Type*.—*Secodes phlæotribi* Ashmead.

Tarsi 5-jointed; hind tibial spurs double; antennæ inserted slightly above the ventral ends of the eyes, 13-jointed, 3 ring, 5 funicle joints, the three club joints not very distinctly divided, especially the small last, the latter without a terminal spine. Funicle joints all somewhat wider than long, the first longest, slightly shorter than the normal pedicel. Head rounded from cephalic aspect. Venation normal, the marginal vein a little over two-thirds the length of the submarginal, the postmarginal elongate, nearly as long as the marginal, twice the length of the short stigmal, the stigma being larger than usual. Several lines of the fine discal ciliation, notably one from the stigma to blade apex, regular and distinct. Parapsidal furrows distinct. Propodeum short. Scutum long. Scutellum subquadrate, its lateral margins delicately indented, appearing as lateral, grooved lines but not these as usually understood. Scutellum with not more than four bristles. Strigil strong, the cephalic tibial spur forked. Propodeum with a weak median carina. The original description of the genotype is correct. Its body is scaly.

From the female type of genotype, now remounted on a tag in the U. S. National Museum, the antennæ, a fore wing, a middle tarsus and a hind leg together on a slide.

This genus is certainly very anomalous. I doubt if it is an eulophid, because of its two hind tibial spurs, the forked tibial spur of the cephalic legs and the five tarsal joints.

Emersonopsis, new genus.*Type*.—*Entedon arizonensis* Ashmead.

Original description correct. All the tarsi concolorous. Antennæ 9-jointed with two rather large ring-joints, the club 3-jointed, the funicle 2-jointed, club with a short, terminal nipple. Pedicel much longer than wide, slightly longer than funicle 1; funicle 2 subglobular. Postmarginal vein shorter than the very short, sessile stigmal. Propodeum medially produced into a neck like the abdominal petiole, the latter very short and ventrad of the

former. Propodeum with a broad, smooth, median carina which runs only to the base of the neck; on each side of it a flat groove which is densely, finely scabrous like the surface of the neck, and bounded by a delicate carina laterad; a quadrate area laterad of this carina is divided obliquely into a glabrous half-area (cephalomesad) and a half-area which is foveo-sulcate; this is really formed by a lateral groove narrowing mesad which extends laterad from the apex of the groove alongside the median carina, and then cephalad to a point just mesad of the spiracle; therefore, there is a lateral carina which forms the lateral and caudal margins of this groove, and extends besides some distance down the neck of the propodeum. This groove really encircles (cephalad) the spiracle. Hind coxæ scaly (dorsal aspect). Face with a X-shaped suture, the point of crossing at about the apex of the scrobes, scaly ventrolaterad of each antenna. The latter are inserted at about the ends of the eyes. A suture leads from the cephalic ocellus to the point of crossing of the diagonal ones. Occiput finely scaly.

The second segment of the abdomen occupies three-fourths of the surface. The propodeum is nearly as in *Pseudomphale*.

From the female type in the U. S. National Museum on a tag.

Type.—Catalogue No. 13145 U. S. N. M.; plus a slide with antennæ and pair of wings.

THE INSECT COLLECTIONS OF CANADA.

BY A. F. WINN, WESTMOUNT, P.Q.

At the annual meeting of the Entomological Society of Ontario, held at Guelph in November last, instead of adding a presidential address to the already lengthy programme, I made a few remarks on the Insect Collections of Canada, and suggested that it might be of interest not only to the members of the Society but also to many living beyond our borders to know just where the various collections, public and private, are situated and something about what they contain.

The idea seemed to meet with the approval of the meeting, and the Editor was willing to find space in the pages of "The Canadian Entomologist" for a series of articles describing briefly any collections of which data could be obtained; the descriptions might include mention of any notable varieties or types, collec-

tions from out of the way localities, desiderata whether by exchange or otherwise, and perhaps in some cases be illustrated by half-tone cuts of the museum or room in which they are housed.

It is hoped that all our members will co-operate, so that the series, when complete, will really be contributed to by everyone who has a collection. Our Society is unique in having its Branches and individual members scattered over such a wide area, and if this series of articles is helpful in bringing the members from Halifax, N.S., to Victoria, B.C., into closer touch with one another, one of its objects will have been attained.

It seems fitting that the first article should deal with the collections of our Society at its headquarters at Guelph, and the Rev. Dr. Bethune has kindly consented to write it. So far as practicable other articles will appear in order geographically from east to west—the collections in the Maritime Provinces next, followed by the Province of Quebec, and so on westward. It is not at all necessary that the same plan of describing the collections should be adopted throughout the series; on the contrary the more individuality about them the better, but for the benefit of visiting entomologists it is desirable that no collection should be overlooked, and that the owners should not be so modest as to hesitate about having their treasures referred to in print.

At this most critical time in our history every topic discussed leads to the subject of the war, and there is no doubt that when the end comes and peace reigns again there will be a great demand for insect material from Canada, especially from the entomologists of the British Isles, which we will more cheerfully than ever supply if it be in our power. There must also be, unfortunately, scores of enthusiastic collectors in Belgium, in France and in Poland whose homes have been laid waste by the enemy and whose collections have been absolutely destroyed. Of those who return most will, in their spare minutes, turn from their hatred of man to the love of nature and will at once begin to form new collections. To any such, it is hardly necessary to say that the entomologists of Canada will be found ready to send any material they have, or can obtain, that will be of interest in connection with their studies.

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POPULAR AND PRACTICAL ENTOMOLOGY.

COLLECTING WASPS AND BEES.*

BY F. W. L. SLADEN, OTTAWA, ONT.

By general consent the Hymenoptera are considered to be the highest order of insects, that is, the most specialized, adaptable and highly organized in the adult state; and the stinging Hymenoptera, consisting of the ants, wasps and bees are the highest section. Yet, although these insects are conspicuous, abundant and easily preserved, this is one of the neglected orders. It is true there are some "critical" groups, especially among the bees, but in many genera the species can be separated easily. During the past four years, the writer has been working at the wasps and bees of the National Collection of Canada, during time that he could spare from his apicultural duties; first, examining and separating into species the material found in the collection and, second, losing no opportunity to collect specimens, both in the Ottawa district and during his annual tour of the provinces. Sufficient material has now been accumulated, chiefly by collecting, to start making keys to the species in hand, and several genera have already been thus dealt with.

Beginners often find it hard to separate the males from the females. The best distinguishing character is to be found in the antennæ, which are thirteen-jointed in the males (only twelve-jointed in some species of the wasp genus *Crabro*) and twelve-jointed in the females; the first joint (scape) is very long, the second joint is very short, and in the bee-genus *Nomada* scarcely discernible. Further, in the males the abdomen normally has seven segments exposed, but in the females only six. However, in some genera one or two of the apical segments are covered in both sexes. The chitinous genitalia of the male are replaced in the female by the sting.

*Part of this paper was read at a meeting of the Quebec Branch of the Entomological Society of Ontario, at Montreal on Nov. 16, 1916.

The wasps are predatory, choosing as their victims spiders, flies, ants, caterpillars, etc., according to the genus. The great army of the bees has made an alliance with the flowers, cross-pollinating them in return for food of the richest and daintiest kind—pollen for the nurture of their young, aromatically flavoured nectars for their own delectation. There are many instances of certain species of bees associating only with certain species of plants. In the bees the body hairs are branched or plumose and gather up the pollen dust from the flowers they frequent, and they have beautifully adapted apparatus, becoming more intricate and perfect in the more specialized families, on their hind legs—and in one group (the leaf-cutter bees) on the underside of the abdomen—for collecting this pollen. In the wasps the body hairs are unbranched.

No species of bee runs riot, multiplying by millions under favourable conditions like certain insects in other orders, for the interesting reason that from nearly every genus in which are found species that by dint of special vigour or adaptability are inclined to overproduction, there has sprung a non-industrious genus, the species of which prey on the abundant industrious species, laying their eggs in their nests. The parasite, when it hatches, usually consumes both the host egg or larva and also its store of food, but in case of the semi-social bumble-bees, the parent parasite lives in the nest, producing young which the host workers tend and feed as they do their own brothers and sisters. As parasitic genera in all stages of separation from the host genus occur, we have here presented one of the most attractive and promising fields of study for the evolutionist that can be found. In some cases the parasite has drifted from its original host and has taken up with another. In general, the parasitic genera are less hairy than their hosts, and their tegumental colours are brighter. The bumble-bee parasites closely mimic their hosts and have so much structural similarity to them that they must have developed their parasitism comparatively recently.

In Canada by far the richest regions in species of wasps and bees are certain localities near and reaching to the southern borders. Three very rich localities can be distinguished. One of these is in Old Ontario, especially the region south of Toronto. Another,

probably one of the richest in the Dominion, is in the dry belt of Southern Alberta. The third is at low altitudes in the dry interior of British Columbia, especially its southern end. Most of the species peculiar to these regions are restricted to special habitats, of which the most important are sand hills or sandy or gravelly slopes or cliffs facing south on the shores of lakes or rivers, or in valleys, and some species are found only on certain flowers. The most productive single day's collecting I have obtained in Canada was at Medicine Hat, on August 21, 1916, on the summit of gravelly bluffs on the north side of the river. The captures would have been in better condition had I taken them two weeks earlier.

Coming second in productiveness are localities like South-western Quebec, Southern Manitoba, the Arrow Lakes and Victoria, B.C. On the sea cliffs bordering Beacon Hill Park at Victoria I made some good captures on August 15, 1916, although fifty yards from the edge of the cliff nothing of interest could be found. Such places as Banff and Athalmer in the Eastern Rockies must not be omitted. At places like Banff and Kaslo (which is richer) we get a mixture of boreal and southern species, and representatives of the bee-genus *Osmia* are especially abundant in spring. At Banff and Lillooet eastern forms are also found.

Passing northwards beyond these special localities, we enter into the boreal zone where the species are much less numerous and are very widely distributed. Many of the species of *Vespa*, *Megachile* and other genera stretch across the continent from the Atlantic to the Pacific practically unchanged. Many other species, including the majority of *Bombus*, will stretch from the Atlantic to the mountains of British Columbia, there to be replaced by mountain or coastal species.

The coast of Nova Scotia, including the Annapolis Valley, and also the lower mainland of British Columbia, including Vancouver and its environs, have not so far proved particularly rich in species. They are essentially boreal, even more so than the south and east coasts of England.

While wasps and bees can be caught in plenty on any warm day in spring or summer, there is a pageant of newly appearing species from early spring until well on in the autumn. There are two seasons at which the number of species to be found in good

condition is much greater than at others. The first is in the spring, starting with the first fine days as soon as the willows are in bloom, at which flowers and others, numerous species of the bee genera *Andrena*, *Osmia* and *Halictus* swarm. This is the time when the beautiful, large queen bumble-bees can be secured in fresh and unfaded condition. These early insects belong to two classes; those like *Andrena* and *Osmia* that have reached the adult stage the previous autumn, but have deferred emergence until spring, and those like *Bombus*, *Halictus* and *Vespa*, consisting of females only, that have hibernated and left their mates to die before winter. After a lull in June the great summer procession begins, and it goes on until the middle of August. The species are now more numerous, but the specimens less plentiful than in spring, so that searching in choice habitats will usually prove very productive. These summer fliers have mostly passed the winter in the full-fed larval stage.

A few notes about killing and mounting wasps and bees may be helpful. A cyanide bottle is usually satisfactory for killing if used with care. It should contain plenty of dry blotting paper or other absorbent to prevent specimens rolling about and thus damaging their coats with moisture, and the specimens should not be allowed to touch the cyanide, and should be removed within one or two hours to avoid the reddening of the yellow tegumental markings by the cyanide.

On a collecting excursion, lasting several days, the specimens may be laid between layers of cotton batting in cigar boxes, and may be relaxed and mounted in the autumn. To mount them, use a No. 3 steel pin for all moderate or large-sized specimens, and a No. 2 for all small ones, except the very smallest, which may be mounted on small, triangular strips of cardboard with glue or fine points, the cardboard being run on to No. 3 pins. Avoid using No. 1 pins. In the quick handling of dried specimens mounted on these, the abdomen is very likely to fly off and the pin may bend; also use store boxes lined with deep, soft material such as pith, not thin hard cork or linoleum. Do not trouble to spread the wings, it is hard and costs much time to do this satisfactorily, and where it is attempted the specimens take up a great deal of room, but see that the propodeum (metathorax) and base of the abdomen are

exposed well to view. In some genera it is important to open the mandibles and expose the male genitalia. Any such treatment is always better accomplished in relaxed specimens than in fresh ones, the parts in the latter tending to return to their former positions. Every specimen should be labelled with the date and locality of capture, and the collector's name written or printed in very small, clear letters on a small, white card. Collect preferably only newly emerged, unfaded specimens, not dusted with pollen, and do not be afraid to make a large collection. How pleasantly the collector can spend an hour now and then during our long winter, arranging the summer's material into species, according to similarities in sculpture and livery, guided by nature, musing the while on the possible value to the species of some remarkable structures or pattern of colours! A study of the insects in the field, or of their marvellously diverse and interesting nesting habits, will confute or endorse many a theory thus formed.

SOME DRAGONFLIES FROM PRINCE EDWARD ISLAND.

BY E. M. WALKER, TORONTO.

Somewhat more than a year ago I received from Dr. A. G. Huntsman, Curator of the Dominion Biological Station, St. Andrews, N.B., a number of dragonflies, including a few nymphs, which he very kindly collected for me during a few days spent in Prince Edward Island in the summer of 1915.

Hitherto there have been apparently no records of dragonflies from this Province, so that, although the number of species listed here is small, and doubtless represents but a fraction of the Odonate fauna of this island, it seems worth while to record them.

All of the species are widely distributed, and with one exception all could have been predicted almost with certainty to occur in this region.

The localities and dates of collection are as follows:—

Charlottetown, pond in Victoria Park, Aug. 3.

Souris, pond on New Harmony Road, Aug. 1.

Little Harbour, near Souris, Aug. 14.

Souris, Sept. 5.

Rollo Bay, Aug. 21.

1. *Lestes congener* Hag. Eleven nymphs, 8 full grown and 3 belonging to the penultimate stage, were taken from the pond on New Harmony Road, Souris.

2. *Lestes unguiculatus* Hagen. Charlottetown, 2 ♂s, 1 ♀; New Harmony Road, Souris, several nymphs from the pond, probably belonging to this species.

3. *Lestes uncatus* Kirby. Charlottetown, 1 ♂.

4. *Lestes disjunctus* Selys. Charlottetown, 1 ♂, 1 ♀; Little Harbour, Souris, 2 ♂s, 4 ♀s; Rollo Bay, 1 ♀.

These four species of *Lestes* seem to be generally distributed in the Canadian and Transition zones from Atlantic to Pacific. It will be noticed that the same four species and no others are included in Mr. Whitehouse's list from Red Deer, Alta., (Can. Ent., vol. XLIX, 1917, p. 96).

5. *Nehalennia irene* Hagen. New Harmony Road, Souris, 1 ♂.

6. *Ischnura verticalis* Say. New Harmony Road, 1 ♀; Little Harbour, Souris, 6 ♂s, 7 ♀s; Rollo Bay, 2 ♂s, 6 ♀s.

One of the males from Souris is somewhat teneral, the others are fully mature, the females all pruinose.

7. *Enallagma hageni* Selys. Charlottetown, 2 ♂s; New Harmony Road, 3 ♀s; Little Harbour, 8 ♂s.

This and the preceding two species are unknown in the western half of the continent; Nos. 5 and 7 ranging into Manitoba, while No. 6 has not been taken in Canada, west of Nipigon, Ont.

8. *Enallagma civile* Hagen. Souris, Sept. 5, 1 ♂ in full colour.

This is chiefly a western species, and is rare in Canada. Its occurrence in Prince Edward Island was unexpected, although there is an old record of its capture in Quebec. I have also received it from Manitoba.

9. *Æshna interrupta interrupta* E. Walker. Little Harbour, 1 ♂. The spots formed by the interrupted lateral thoracic bands are rather large and rounded, though completely separated. New Harmony Road, one full-grown female nymph.

10. *Æshna umbrosa* E. Walker. Charlottetown, fragments of two male exuviae from pond, apparently this species; New Harmony Road, one ♂ exuvia and four very young nymphs.

11. *Somatochlora elongata* Scudd. Rollo Bay, 1 ♂. Not known west of Wisconsin.

12. *Libellula quadrimaculata* L. Charlottetown, 3 ♂s; New Harmony Road, 4 nymphs, two belonging to the penultimate stage, the others younger.

13. *Sympetrum obtrusum* Hagen. Charlottetown, 5 ♂s, 2 ♀s, two of the ♂s recently emerged; Little Harbour, 2 ♂s; New Harmony Road, 1 full-grown nymph.

14. *Sympetrum rubicundulum* Selys. Charlottetown, 3 ♂s; Little Harbour, 1 ♂, New Harmony Road, 1 ♂ 3 ♀s., all teneral.

15. *Leucorrhinia hudsonica* Selys. New Harmony Road, 2 nymphs, penultimate and ante-penultimate stages.

This and the preceding three species are transcontinental species, *L. hudsonica* being confined to the boreal region.

16. *Leucorrhinia intacta* Hagen. New Harmony Road, one nymph of the penultimate stage apparently belonging to this species. Another similar younger nymph was also found.

Distributed as far west as Alberta, (see Mr. Whitehouse's list, Can. Ent., vol. XLIX, p. 96.) but not common in the Canadian Zone.

THE STATUS OF LECANIUM CORNI BOUCHE IN NEW JERSEY (HOMOP.)

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

This insect is undoubtedly the best recorded of all the species listed in Smith's "Insects of New Jersey," inasmuch as it appears at least eleven times disguised under as many synonyms. J. G. Sanders, in his paper, "The Identity and Synonymy of Some of Our Soft Scale Insects," (Jour. Econ. Ent., 1909, p. 428) mentions 41 or 42 synonyms of *Lecanium corni* Bouche, and eleven of them managed to appear in Smith's list.

Sanders states that it is widely distributed in North America, the most important hosts being plum, peach, apricot, pear, currant, blackberry, mulberry, osage orange, elm, ash, linden, pecan, maple, Cornus, etc. It also occurs in Europe in greenhouses on peach and grape and outside on various plants including currants, goose-

berries, raspberries, Cotoneaster, Corylus, Boxwood, Thuya, Viburnum, locust. It has been found recently in New Jersey on boxwood in nurseries at Rutherford, Elizabeth and Riverton, evidently having been imported from Holland on such stock within the last few years inasmuch as it is sometimes reported by inspectors examining imported boxwoods.

It has been correctly recorded from New Jersey in "Entomological News," vol. XXVI, p. 102, where it appears as *Lecanium corni* Bouche, although nothing is said there concerning its synonyms, and the only host mentioned is boxwood. In Smith's list it appears as follows under the genus *Eulecanium*:

E. armeniacum Craw. The apricot scale; found also on plum, pear, cherry, peach, etc., but not abundantly enough to be injurious.

E. canadense Ckll. Mass. to Ohio on elm, maple, oak, hickory and peach, and should be found in New Jersey.

E. cerasifex Fitch. New York plum scale. On cherry, plum, peach, apple, pear, etc.; not common nor injurious in New Jersey.

E. corylifex Fitch. On Corylus and Viburnum.

E. cynosbati Fitch. On gooseberry and Gleditschia.

E. fitchii Sign. Found in N. Y. on raspberry and blackberry.

E. juglandifex Fitch. The butternut scale.

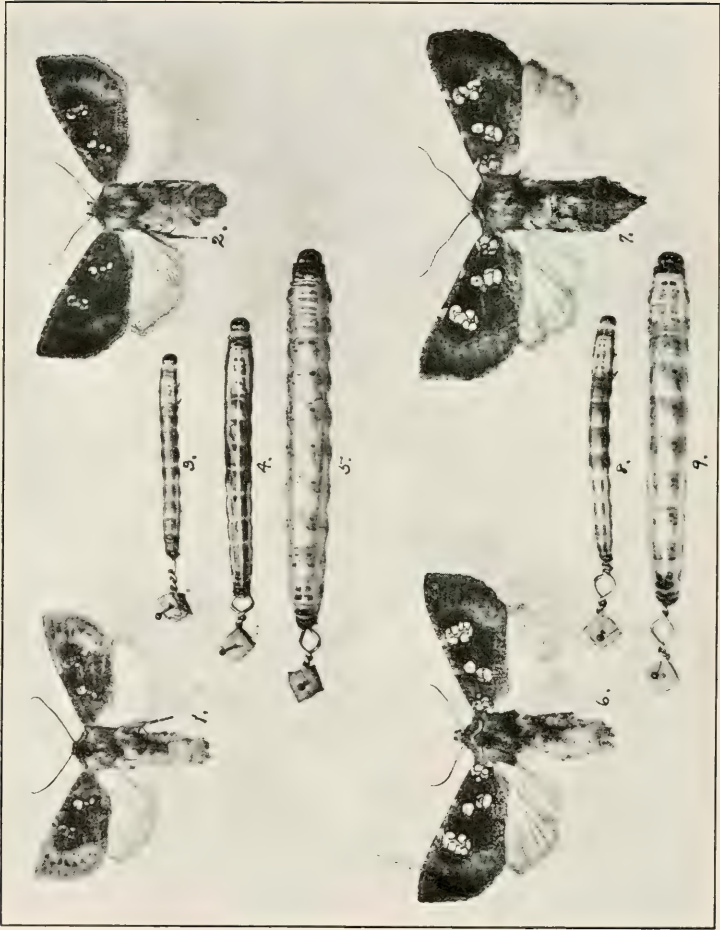
E. kingii Ckll. On sassafras and *Vaccinium corymbosum* in Mass. and Conn.

E. lintneri Ckll. & Benn. On sassafras in N. Y. and probably in N. J.

E. pyri Schr. On pear, apple, hickory and white thorn.

E. ribis Fitch. The "currant scale." Found on currant, gooseberry, mulberry, etc.

While all of the above are not strictly New Jersey records, it is evident that the species occurs on various hosts within the State, but never in sufficient numbers to be injurious. This condition of affairs, true at a time when the list was prepared, still holds good. If anything, this particular scale can be said to be rather rare in New Jersey at the present, and at no time was it ever abundant enough to require the application of remedial measures.



PAPAIPEMA POLYMNIAE AND P. ERYNGII. (See p. 128.)

NEW SPECIES AND HISTORIES IN PAPAIPEMA
SM. (LEPIDOPTERA.) NO. 19.

BY HENRY BIRD, RYE, N.Y.

With the hope of further disclosures under this heading, an investigation of the flora in the vicinity of Washington, D.C., was undertaken in June, 1915. *Papaipema nehrasyntheta* Dyar, described from this locality and unknown in the larval stage was particularly in mind, but results for this species were unsuccessful. The perennial plant life showed some departure from that of the latitude of New York, one instance of easy notice occurring with *Polymnia uvedalia* L. At the first occurrence of this plant a contained larva was noted, and it seemed different from any of the congeners. While conspicuous on account of size, but few examples of the plant were found, and only six larvæ resulted from the search of that year. After observing several of the larval stages, it was evident an unknown one had been discovered, but it seemed too small to be the wished-for desideratum. Eventualities claimed all of these larvæ prior to pupation, so it remained for a search in 1916 to uncover a sufficient number in late July, when near maturity, whereby a convincing series of adults came to hand. Though the departures with the adult are slight, with the sum of evidence it is very clear an undescribed species is involved. From the fact the genus *Polymnia* is restricted to America, in itself suggestive of a possibly ancient relation between the two, and because of it clearly proving to be a preferred food plant in the faunal area where discovered, we propose as a name:

***Papaipema polymniæ*, n. sp.**

Head generically normal and smooth on frons; heavily clothed with long, erect scales of brownish colour mixed with grey and pervaded with a purplish tone, which colouring holds for the entire thoracic vestiture. At the base of the antenna a ring of light, but not pure white scales occur; the antennæ are simple, under magnification showing minute cilia and with scarcely any sexual disparity. The thorax is heavily clothed, the collar margined above with yellowish usually; the erect, spreading anterior thoracic tuft of the normal pattern; the tegulæ more or less powdered with yellow; the posterior tufts prominent and spreading; legs have long hairs on femur, the fore- without, the mid- with one pair, and the hind

tibia with two pairs of spines; the tarsus ringed faintly at the joints with light scales.

Fore wing: basal area, median field and terminal space brassy yellow which may be said to be the pervading colour, the purple-brown body-colour appearing as minute powderings, sometimes in the terminal space obliterating the yellow, except at the apex. the ante- and post-median areas purplish, tempered by the body brown, becoming more bluish in some specimens and exhibiting a glistening sheen especially in the outer area. Maculation of the usual pattern but not sharply drawn; basal line vague, except as it outlines the basal spots which are yellow and never white; ante-medial line brown, sinuous, extending close to the claviform, below which, at the submedian vein, it outcurves to the inner margin; median shade-line occasionally traceable as an angled brownish shading, best defined in the lower median field; the post-median line geminate, the inner brown, the outer dull purplish, outcurved over the cell, thence incurved with a nearly full ogee sweep to the inner margin. The sub-terminal is very irregular, paralleling in a way the outer margin, and consists of a series of dentations running outward on the veins in little points. It defines the terminal area with a glistening boundary that is not, however, very contrasting. The fringes are slightly dentate, dull purplish and glistening. The stigmata are of the usual formation, but not large; the orbicular is rounded, white, with a yellow scale at centre; claviform double, two spots in line with the orbicular, the upper minute and occasionally yellow, the lower white. The reniform consists of a lunulate, yellow marking around which are a number of small spots clustered in the usual manner and cut by the veins, the innermost usually white, the outer one yellow. The secondaries are smoky-brown, shaded darker at the outer margin. The abdomen is of similar hue. Expanse 32 to 43 mm.

The male genitalia are generically typical and offer no particular specific feature. The corona is more fully rounded than most of the allies, with the pollex prolonged prominently and at right angles to the costa, and this section of the valva heavily spinose, as is customary. At the clavus, or perhaps better defined as the anterior margin of the sacculus, a patch of dense setæ occurs.

Habitat.—Washington, D.C., and its immediate environs; a

specimen from the Black Mountains, N.C., (W. Beutenmuller), also a pair from Elizabeth, N.J., (O. Buchholz), are referred to this species. Type locality, Roslyn, Va. A male type is with the author, also four paratypes which may later be distributed. In coloration the species is near *cataphracta*, indeed were the early stages unknown it would easily pass as the white-marked variety *cataphracta fluxa*. In the structure of the genitalia it seems nearest *merricata* and may find a serial position near that species.

Polymniae larvæ do not depart from the typical feeding habits. The hibernated ova doubtless hatch about the last week of May, and the plant is entered well up the stem at some tender point. When in luxuriant plants, whose height attains seven feet at times, the gallery is at some midway portion; in small plants it may finally reach the root crown by maturity. While the stem has a slight hollow core and though the walls are heavy, feeding continues at one point long enough for the plant to produce a noticeable swelling that gives ready intimation of a contained host. No parasites were encountered, but a heavy mortality resulted from fungus infection, probably the same as occurs with *speciosissima*, as the coloration and effects seem identical. The gallery is abandoned at maturity, and in confinement a pupal cell is formed about two inches underground. Larvæ, at the latitude of Washington, leave the plants Aug. 1 to 10.

Larval observations have been made from June 15 onward, and the following instars noted.

Stage IV.—Head polished, honey yellow, obliquely marked at ocelli with a black line; body colour pale brown, with a more or less pinkish tone. The dorsal is a continuous stripe from cervical shield to anal plate; the sub-dorsal and sub-stigmatal are continuous on thoracic segments to the middle of joint three, thence interrupted to the middle of joint seven where it continues to the plates of joint thirteen, this break being productive of the girdled appearance common to the genus. These markings are yellowish white, the sub-stigmatal on the abdominal joints merging into the yellow white of these segments ventrally. Cervical shield laterally edged with black; anal plates conspicuous; tubercles well defined though small, all excepting IV smaller than a spiracle. On joint ten there is evidence of IVa forming.

Stage V.—Structurally similar, but colour much darker, frequently a deep purple brown with the stripes showing very contrastingly. On joint ten IVa is well developed, though not bearing seta, as does IV.

Stage VI.—Colour fades to dull pink, the pale yellow lines wide and conspicuous. Tubercles I and II become more prominent, especially on joint eleven; and on twelve their merge into a single plate preceding the anal shield, is even of greater definition.

Maturity.—The full-grown larva is normal for the group, though rather robust as compared with the resultant moth. The lines become vague and the general tone a yellowish translucence, with the brown plates at the tubercles conspicuous when they are larger than the black spiracle. The single seta they bear is scarcely discernible except with a lens. The head assumes a darker hue, and the anal plate becomes heavier and nearly black. Tubercle IVa on joint ten seems never to bear setæ. Larval lengths for the stages: 27, 33, 40 and 47 mm. respectively.

The pupa shows no departure from normal. It is polished brown, the shell of rather thin texture so that the white stigmata of the primaries may be discerned a week prior to emergence. Fungus claimed a large percentage whether left in the earthen cell or removed and given antiseptic treatment. Thus the assumption arises that infection occurs while the larva is yet feeding. The pupal period is about four weeks; emergence dates for the series bred, Sept. 3 to 23.

One of the first plants to attract attention while examining the flora of the Chicago Plain in 1915, was *Eryngium aquaticum* L., one of those anomalous denizens of this area which subsist equally well through great extremes of moisture, or of dryness. We were under the able guidance of local entomologists, Messrs. A. Kwiat and E. Beer at the time, and remarked this one seemed favourable for tenanting a *Papaipema*, its Yucca-like foliage suggesting something quite different from the usual line of food plants. Should such an one be selected, the associate might be expected to show some departure from the customary type, and our enquiry if this plant had been followed up previously elicited the reply that numerous observations of it the preceding year were negative in result. At a momentary pause, Mr. Beer devoted himself to several

plants in the foreground, and was successful in finding, in the crown of the taproot, a penultimate stage *Papaipema* larva, close to *P. cerussata*, yet differing in one important detail. As this discovery happened early, the remainder of the time allotted the trip gave opportunity for securing a representation, and ultimately the details at hand show a distinct and undescribed species. While it would be fitting to honour the discoverer, our confreres consider it will be more helpful to call the species suggestively:

***Papaipema eryngii*, n. sp.**

Head smooth on frons and similar to the preceding species, except that the colour is a darker purple, as is also the body tufting. The upper tarsal joints on all legs are prominently ringed with white in this instance. Fore wing: at the extreme base a white dot; the usual basal spots conspicuous and yellowish to pure white; the ante-, post-median and terminal areas are rich purple brown; the median field dark castaneous to red brown, becoming lighter near the inner margin where it shows yellow powderings; near the apex a powdery yellow patch prevails. The lines follow the characteristic courses, as with the preceding, are ill defined, and except for the large and brightly white-marked stigmata, there would be little contrast. The post-medial line is drawn sinuately from a prominent yellow spot on the costa above reniform outward in an uneven-sweep past that marking, thence obliquely and irregularly to the inner margin. The subterminal line is vague, a broken sprinkling of yellow scales defining a boundary of adjacent areas that are for the most part concolorous. The reniform is comparatively large, a central yellowish lunulate line is surrounded by seven white spots; the orbicular and claviform appear as an equally pronounced marking and consist of three superimposed white spots, the claviform being divided into two, the upper of which is smallest and stained with yellow. Several white dots appear on the costa, and one outside the basal spots; fringes slightly dentate. The hind wing is a dull, smoky fawn, sometimes assuming a rosy tint and overlaid with dark purplish powderings, deepening near the margin into a vague sub-terminal shading, and occasionally an outer line may be discerned. Beneath, the wings are deeply powdered with smoky purple. Expanse 35 to 48 mm.

The male genitalia exhibit in this case a good instance of specific individuality. This modification exists in the terminal character of the clasp, with the harpe, a stout sickle-shaped member, larger than in any ally. Instead of the produced costal angle at the corona, the margin terminates squarely and is prolonged below into a curved hook or pollex; this section of the valva heavily spinose as usual. The harpe arises in close juxtaposition and exceeds the pollex so that these two points, unique in their nearness, may be seen in the specimen without preparation of the parts.

Habitat.—The type locality is the prairie environs of Chicago, Ill., and the species doubtless enjoys a wide range through the prairie zone supporting the food plant, though it has thus far eluded collectors, apparently. A large series of bred specimens are under observation, and a number have been labelled "paratype" as representative for several collections. A male type and several further paratypes remain with the author. Variation in ground colour runs from a dark, almost blackish-purple, powdery effect to an even, rich, reddish tone, while one of the series showed the stigmata much reduced. These conspicuous white markings, inclusive also of the basal spots, are similar with *marginidens* and *nephra syntheta*, with a strong superficiality in the direction of the latter. The larval features denote a relationship to *cerussata*, while the genitalia denote a proximity with Californian species in one direction, which might not be unexpected, as the food plant is generically more at home in the Southwest.

The character of this food plant is such that the entry and future operations of the larva produce little evidence along the usual lines suggestive of *Papaipema* work. The egg overwinters and the young larva emerges about the first of June. A conspicuous amount of frass is thrown out, but may be hidden in the cluster of close-lying leaves which by reason of their spined edges are not pleasant to handle. The flowering stem is mined to some extent, though most of the work is in the root-crown, the larva working usually in more than one taproot. As old clumps consist of several taproots, this is easy, also one clump may furnish several larvæ and these older plants are invariably selected for oviposition. Fire plays a most important rôle in the economy of the species, and the early failure of my co-labourers to meet with it was doubt-

less due to this factor. They kindly secured some of the early stages in 1916 which were missed the previous year, and such fullness as this note contains is largely due to their efforts.

Stage IV.—Of the cylindrical type common to the genus. Head honey yellow, mouth parts concolorous, the ocelli only darkly marked. Body of deep purplish brown tone, contrastingly marked by the longitudinal dorsal, sub-dorsal and sub-stigmatal white lines, the latter on the six posterior segments merging ventrally to a concolorous under surface of whitish. These lines are broken on the first four abdominal segments, which appear as a dark girdle completely encircling the larva. The cervical shield sharply bordered with black laterally, with the other plates and tubercles normal. Tubercle IVa on joint ten begins to show definition.

Stage V.—Similar.

Stage VI.—The dark body colour still holds, with the lines which are always broken on the first four abdominal segments, broad and contrastingly drawn in white. Tubercles attain greatest definition in this stage, being black for the most part and those laterally surrounding the spiracles very conspicuous. On joint ten the spiracle is surrounded by five tubercles, III, IIIa, IV and V about the size of the spiracle, while IVa is even larger and very close to the upper corner, caudad; on eleven, III and IIIa are merged into an elongate plate bearing one seta. The anal shield is heavy, rugose and brown—not black. Ventrally a salmon tone prevails that is quite characteristic.

Maturity.—Similar to preceding, the colour lighter but does not fade to the frequent translucence of this instar. Proportionate to the increase in size, the tubercles seem smaller. Observations were from June 14 to Aug. 15, when all larvæ had left the plants to pupate. The duration of stages increases toward maturity with the last instar lasting twelve days in two cases observed. Length of larvæ from the stages, approximately, 34, 39, 45 and 50 mm.

Eryngii larvæ approximate closely *cerussata*, differing in coloration of the last stages, and in having the anal plate brown, whereas it is black with the latter.

The burrow seems to be deserted generally for pupation, but two instances occurred in confinement where this was not so.

The pupa is robust, dark shelled, and active; the frons is in no way produced, the thoracic region and wing-covers rugose, the remainder shining except the interstices of the abdominal sutures which are finely punctured. Two sharp spines occur at the cremaster, and a subsidiary spine occasionally on the last segment laterad.

Average length 23 mm.; diameter 7 mm.

Emergence dates range from Sept. 25 to Oct. 15.

***Papaipema nephrasyntheta* Dyar.**

The unique type of this species has remained in the United States National Museum since its description in 1908 until recently, without a counterpart. In conversation with its captor, Mr. E. A. Schwarz, we learn it was taken at light on Plummer's Island, Md., Sept. 27, 1904.

A second example from the same source and caught at the same time, has recently been placed in the Museum collection and this, though unspreadd, gives a better idea of the coloration since it is brighter, whereas the type would seem as if it might be somewhat faded. It was at first believed the *Eryngium* feeder was this species, but a careful comparison forces an opposite conclusion. The Dyar species is of a lighter, clay, ground colour, with the central marking of the large white reniform a white lunulate line, an unusual feature in the genus. *Eryngium aquaticum* does not flourish at the type locality, and we incline, with its author, to consider it a close ally of *marginidens*, with the larva yet unknown. Both the specimens at Washington are females, hence the value of genitalic comparisons are not available.

EXPLANATION OF PLATE VIII.

(Figures Natural Size.)

- Fig. 1 *Papaipema polymniæ*, male.
- " 2 *Papaipema polymniæ*, female.
- " 3 *Papaipema polymniæ*, larva, stage IV.
- " 4 *Papaipema polymniæ*, larva, stage V.
- " 5 *Papaipema polymniæ*, larva, mature.
- " 6 *Papaipema eryngii*, male.
- " 7 *Papaipema eryngii*, female.
- " 8 *Papaipema eryngii*, larva, stage IV.
- " 9 *Papaipema eryngii*, larva, stage VI.

THE OCCURRENCE OF THE GENUS *PARACHRYSOCHARIS* GIRAULT IN THE UNITED STATES.

BY A. A. GIRAULT, GLENNDALE, MD.

The following species was found in the collections of the U. S. National Museum:

Parachrysocharis semiflava, new species.

Female.—Length 0.87 mm.

Dark metallic green, the head below the antennae, the legs, ventral aspect of the abdomen, the scape, the pedicel (except above at basal half), venation and tegula, lemon yellow. Cheeks yellow. Wings hyaline. Head and thorax densely, not very finely scaly. Propodeum distinct, moderately long, tricarinate, the spiracle round, moderate in size. Axillae much advanced. Mandibles tridentate, the outer tooth largest, widely separated from the middle one, falcate, the third tooth minute. Funicle joints all a half longer than wide. Parapsidal furrows complete, distinct. Club with a distinct terminal nipple. Postmarginal vein very slightly developed. The male seems to be similar but the funicle 4-jointed (no good specimens). Eight females. Austin, Texas, August 16, 1904, (Carl Hartmann).

Types.—Catalogue No 20803, U. S. National Museum, three females on tags plus a slide with the appendages. There are two ring-joints in this species, the second very short.

THE INSECT DRIFT OF LAKE SHORES.

BY JAMES G. NEEDHAM, ITHACA, N.Y.

During the summer of 1906, while still living in Lake Forest, Illinois, in a pleasant cottage near to the shore of Lake Michigan, I spent all my spare time upon the beach studying the insect accumulations of the shore-line, and trying to settle some of the questions raised by my earlier observations (1900-1904). I visited the beach nearly every day, and collected insects from the drift-line whenever there were any deposited there. Through early and late summer I merely collected when the collecting was good; but during the month of August I made daily careful observations on the insects at the shore-line, and on accompanying conditions of wind, waves and weather. As often happens, I settled a few of my questions and raised many new ones. After waiting ten years

without finding another opportunity for continuing these observations, I have concluded to publish the results. First, I will give the data obtained during August to show the ordinary course of beach collecting (see accompanying table), and then I will add notes on the more abundant species for the entire season.

The shore of Lake Michigan at Lake Forest extends due north and south; hence it is the east wind that deposits drifting insects upon the beach. My observations show that the wind was E.-N.E. when the greatest accumulations of insects occurred. Only once (Monday, Aug. 27th) were there any deposits of insects upon the beach while the wind was blowing from the westward, and at the time of that observation the waves were still running in from N.-N.E., whence the wind had recently shifted.

A number of piers project from the shores, and in the lee of these the flotsam gathers and slowly rotates in isolated broad eddies.

CONDENSED RECORD OF DAILY OBSERVATIONS.

Aug.	Wind.		Flotsam.	Drift.	Abundant forms.
1	N.-N.E.	light	in black patch be- side pier	faint lines on sand.	midges and ladybirds.
2	S.-S.E.	"	in diffuse lines.	almost none	skins of midges and caddis-flies.
3	O.		none.	" "	
4	S.-S.E.	faint.	thin gray layer.	none.	midges.
5	W.	"	none.	"	
6	E.	strong.	"	scattering.	live beetles, etc.
7	O.		"	none.	
8	E.	faint.	thin streaks.	"	skins of midges and caddis-flies.
9	S.W.	moderate.	none.	"	
10	N.-N.E.	"	scanty, gray.	almost none.	
11-17 Observations interrupted.					
18	S.E.	moderate.	little.	none.	
19	W.	"	none.	"	
20	W.	"	"	"	
21	N.W.	"	"	"	
22	N.E.	"	"	scattery-trashy	butterflies, etc.
23	E.-N.E.	strong.	"	abundant, trashy	crickets, etc.
24	E.-N.E.	"	"	"	many forms.
25	S.E.-E.	subsiding.	much.	little.	
26	N.E.	brisk.	none.	much.	grasshoppers, beetles, etc.
27	N.-N.W.	"	much.	"	grasshoppers, butter- flies, etc.
28	W.	gentle.	almost none.	almost none.	
29	W.	moderate.	none.	none.	
30	W.	"	"	"	
31	S.E.-E.	"	"	"	

This flotsam often consists of nearly pure insect material. The most characteristic constituents are the cast skins of may-

flies, midges and caddis-flies, which gather in inconceivably vast numbers, in floating felted mats, that are sometimes an inch or two in thickness, and square rods in area. Every cubic inch of this material represents thousands of specimens. When with shift of wind and rising of waves these mats are cast upon the pier, they cover the planking with a plaster-like coating of ashen-gray hue. There is no place where flotsam can accumulate when the wind blows parallel with the piers, or when the waves break over them.

During the month of August, 1906, there was but one period of abundance of insect drift upon the beach,—a period of three days, the 22–24th inclusive, while the wind was E.-N.E., and following upon warm weather with westerly winds. There were scanty accumulations also on the 1st, 2nd, 6th, 8th, 10th, 25th, 26th, 27th and 28th, always accompanying an easterly wind. Sometimes the drift was a thin line of nearly pure insect remains, scarcely discoverable as a tracing along the sand at the farthest reach of the waves, as on the 1st; sometimes it was a conspicuous line of trash, with insects scattered thinly through the trash, as on the 22nd. On only twelve days of the twenty-four recorded was there any discoverable deposition of insects at the drift-line.

These regular observations supplement earlier more casual ones, and confirm certain opinions as to the occurrence of the drift upon the shore of Lake Michigan as follows:

1. Floating insects can be deposited at the drift-line only when the waves are running shoreward. The wind is, of course, the actuating cause of their transportation by water. The waves follow the wind, but do not quite keep up with its changes. In my notes I find three entries that bear directly upon this:—

“6th Aug.: wind blowing strongly from eastward (it had blown from the west the preceding day). I saw the drift begin to come ashore at close to 7 a.m., bringing in at first many live *Rhynchophora*.”

“22nd Aug.: wind shifted inshore (from N.W.) in afternoon and drift began to appear in the evening. No flotsam; waves too rough.”

“27th Aug.: wind N.-N.W. on land, but waves still running in strongly from N.E.; many grasshoppers.”

2. Deposits of drift vary with the strength of the wind. When too strong, the sand is disturbed and many insects are buried in it. Long, evenly-running waves driven by a steady on-shore breeze give the best deposits.

3. The proportion of insect material in the drift varies with such purely local and accidental causes as the dumpings of straw and ashes from lake steamers, and with many natural causes, the two most important of which seem to me to be:—

(a) Storms, with attendant floods, that carry vast quantities of plant fragments into the lake. Occasionally an abundant accumulation of insects may be entirely hidden amid a still more abundant windrow of this sort of material. Mr. Schwarz once expressed the opinion (1890) that storms have nothing to do with the insect drift; and while it is true that the deposits occur whether there be storms or no, yet I am sure that if an off-shore storm wind blows while any insect is swarming, within a few days that insect will appear in unusual abundance in the drift-line on some lee shore.

(b) Emergence periods of particular insects. This is the most significant of all factors for the collector to bear in mind. What wind and waves gather depends on what nature has brought forth, ready to be gathered. Extraordinary accumulations of May-beetles and of Mayflies are well known to occur at regular times. It was an extraordinary shore deposit of black crickets that first interested me in the insects of the drift line (1900). Hancock has recorded (1894) for another species just the conditions of swarming and flight that made ready this crop of crickets that was gathered by the storm wind. Just after the publication of my paper (1900) recording the accumulation of the crickets in the drift on the shore of Lake Michigan on the 13th of August following a storm from the west, a friend wrote me that there had been an extraordinary swarming of the same species in the streets of the city of Rockford, Ill., (some 65 miles westward) on the 11th—the day the storm occurred. In my August collecting of 1916 I found but four specimens of this species.

Every one who has run a trap-lantern or who has sugared for moths knows how much atmospheric conditions have to do with bringing insects out in abundance. It is the night of high humidity just before a rainstorm that finds most of them astir. The col-

lector who would profit by the salvage of the shore-line would, therefore, do well to pay careful heed to season and to weather. After conditions favourable for swarming accompanied by off-shore winds, then let him search a low, sandy beach on a lee shore. It is doubtful whether there is any other place where specimens may be accumulated so easily and in such variety. Schwarz (1889) records that he and Hubbard in four days collected more than 1,100 species of beetles on the shore-line of Lake Superior at a time when the collecting there was not at its best. The Lepidoptera of the drift-line, to be sure, are worthless as specimens; most of the Coleoptera, however, are good enough for the cabinet, and insects of other orders are often in good condition.

WHAT THE DRIFT-LINE OFFERS.

Besides the vegetable debris brought down by woodland streams, the cinders and straw and other waste contributed by lake steamers, the dead vertebrates such as fishes and birds, a few of which are always present, and a few miscellaneous invertebrates—shells of mussels and snails or occasionally whole specimens of *Gammarus fasciatus*—there are always many insects present in the summer season. There are far more kinds of them than may profitably be listed here; but it may be worth while to mention in each of the orders, the forms most abundantly found in the drift-line, as indicated by my collections through the summer of 1906, during which season I collected merely a sample of the insects present whenever the collecting from the beach was good.

Coleoptera are by far the most abundant insects of the drift. My specimens, 2,248 in number, as determined for me by Mr. Herbert Morrison, represented 26 families and 127 species. The species that were represented by more than ten specimens, the date of principal occurrence, the number of specimens found on that date and the total number of each are as follows:

CURCULIONIDÆ:

Listronotus squamiger Say. VIII, 6:116-127.

Lixis terminalis Lec. VI, 19:10-12.

CARABIDÆ:

Elaphrus fuliginosus Say. VI, 13:31-31.

Pterostichus lucublandis Say. VI, 18: 102-179.

Platynus cupripennis Say. VI, 18:12-13.

Platynus placidus Say. VI, 18:9-15.

Galerita janus Fab. VI, 13:232-267.

Harpalus pennsylvanicus DeG. VIII, 12:117-121.

DYTISCIDÆ:

Ilybius confusus Aube. Date? 8-14.

Agabus confusus Gryl. VI, 13:331-335.

GYRINIDÆ:

Gyrinus analis Say. VI, 19:153-153.

COCCINELLIDÆ:

Megilla maculata DeG. Date? 27-57.

Hippodamia 13-punctata Linn. Date? 14-27.

Hippodamia parenthesis Say. VI, 18:35-39.

Coccinella sanguinea Linn. Date? 5-10.

Anatis 15-punctata Oliv. Date? 44-67.

Chilocorus bivulnerus Muls. Date? 59-66.

LUCANIDÆ:

Lucanus placidus Say. VI, 12:16-23.

SCARABÆIDÆ:

Aphodius fimentarius Linn. VII, 22:88-89.

CHRYSOMELIDÆ:

Leptinotarsa decemlineata Say. Date?:45-75.

Lina scripta Fabr. Date?:17-26.

Diabrotica 12-punctata Fabr. Date?:15-30.

Disonychia pennsylvanica Ill. Date?:101-169.

It may be that owing to my special interest in aquatic beetles, I picked up a larger proportion of such genera as *Agabus*, *Ilybius*, and *Gyrinus* than of the others. I missed the annual swarming of the *Lachnosternas*.

Of Hemiptera, doubtless the most abundant were the aphids, which I did not collect at all, owing to their minuteness and bad state of preservation. Only the larger forms were taken. More than half of these were Pentatomidæ. The grotesque Membracids were represented by three species, *Smilia camelus* Fabr., *Xantholobus trilineatus* Say, and *Cyrtolobis van.* The aquatic Nepa and Ranatra were represented by single specimens. My list, determined also by Mr. Morrison, shows nine families represented by 20 species and 53 specimens. Those represented by more than four specimens are:

SALDIDÆ:

Salda pallipes Fabr. VII, 21:4-5.

GERRIDÆ:

Gerris marginatus Say. VII, 13:9-9. —

Limnoporus rufoscutellatus Latr. VI, 13:5-6.

PENTATOMIDÆ:

Cænus delius Say. VIII, 6:3-5.

Euschistus variolarius P. B. VI, 13:4-7.

Apatelicus cynicus Say. VIII, 1:3-6.

Apatelicus maculiventris Say. VI, 13:10-11.

The Diptera of the drift, are represented mainly by innumerable cast skins of Chironomidæ from the lake bottom, and the many adult midges mixed with them are always in bad condition. Scattering crane-flies are always present—species of *Tipula*, *Pachyrina* and *Dicranomyia*. Besides the flesh-flies of the drift that have been so well treated by Herms ('06) there are often numbers of Anthomyiidæ (*Chortophila*, *Cænasia*, etc.), Borboridæ (*Limosina*), etc., rarely in fit condition for specific determination.

Lepidoptera are represented during the course of the season

by nearly all the free-ranging butterflies, and by many strong-flying noctuids. *Utetheisa bella* was not uncommon in the drift-line on Aug. 23rd.

Hymenoptera and Lepidoptera I did not save for determination owing to their dilapidated condition. The former group is well represented by *Bombus*, *Apis* and several Ichneumonids and a few saw-flies.

The true Neuroptera are represented only by the delicate lace-wings. As determined for me by Mr. Roger C. Smith, these are.—

- Chrysopa oculata* Say. VI, 13:24-28.
 " *chlorophana* Burn. VI, 13:1-1.
Hemerobius stigmaterus Fitch. 2.
 " *conjunctus* Fitch. 4.
 " *hyalinatus* Fitch. 4.
 " *humuli* Linn. 2.
Micromus posticus Walb. 1.

Of Trichoptera, the pupal skins of three species, all undetermined, appeared abundantly in both flotsam and drift, the dates of maximum accumulations being Aug. 1st, 8th, 24th and 25th. The one common adult of the drift-line was *Agrypina curvata* Banks—not "*Glossosoma* sp.?" as reported in my first paper (1900) on Banks' determination. *Neuronia concatenata* Walk. once appeared, a single specimen, and also an undetermined *Leptocerus*.

Of Odonata, there are always present a few large dragon-flies, species of *Æschna* and *Anax*, and often there are smaller ones, *Sympetrum*, *Lestes*, and *Nehalennia*.

The Orthoptera of my drift collection, numbered but seven species. The three which numbered five or more specimens each (as determined by Mr. H. H. Knight) were:—

- Tettigidea lateralis* Say. VI, 13-148, of which but 34 were females.
Melanoplus femur-rubrum DeG. VIII, 23-24, of which one was a female.
Chorthaga viridifasciata DeG. VI, 13-5, all brown females.

The Ephemeridæ are represented abundantly in both flotsam and drift by innumerable cast nymphal skins, and by much fewer adult specimens. I have seen acres of the water surface along shore covered in scattered patches with floating felted masses of the skins of *Ephemera simulans*. On the 21st of July, 1906, there occurred a peculiar drift, that was composed almost entirely of the wings and other disintegrated fragments of adult Mayflies. It lay in grayish, curving lines, so thin it might have been easily overlooked, spread over the sand at the farthest reach of the gentle waves that

were then rushing in. Though inconspicuous, innumerable Mayflies were represented; about half of them, *Ephemera simulans* Walk. and the other half, three species of Heptagenia; *H. pulchella* Walsh, *H. interpunctata* Say, and an undetermined species. These were probably the remains of adults that had finished mating and egg deposition and had fallen, spent, upon the surface of the lake.

The insects one finds at the drift-line on any shore fall in three principal categories:

1. Those present by accident; having fallen into the lake and been swept up by the waves on to the beach. Here belong representatives of practically all orders of insects, among which the strong-flying and highly specialized members of the dominant orders do most abound. It is these that have chiefly been noticed hitherto. The lists that have been published by myself, by Miss Snow (1902) and by Dr. Schwarz show good general agreement.

2. Those that dwell in the lake, and that, on transformation, leave their exuviae floating on the surface. Here belong mainly three groups of aquatic herbivores: Mayflies, midges and caddisflies. It is chiefly the cast skins of these, less often the insects themselves, that one finds floating in the flotsam or cast upon the sand. More careful collecting and study of these would doubtless yield data of great value concerning the times and seasons and relative numbers of the insect population of our lakes.

3. Those that live as scavengers upon the carcasses of the drift-line. Here belong especially many beetles of the families Staphylinidae, Histeridae, Scarabaeidae and Carabidae together with a number of flies that have flesh-eating larvae.

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ON SOME NEW OR NOTEWORTHY COLEOPTERA FROM THE WEST COAST OF FLORIDA.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

Among the Coleoptera taken in the vicinity of Dunedin, Florida, during the past two years are several species which are evidently undescribed, and some others worthy of note on account of their rarity or known distribution. I therefore present the following notes and descriptions relative to them. It may be added that Dunedin is located on Clearwater Bay, three miles north of Clearwater, the county seat of Pinellas County, and 27 miles northwest of Tampa. The bay is formed by a number of keys or islands which parallel the coast of Pinellas Peninsula, about two miles from the mainland. One of these, Hog Island, about five miles long and one-half mile wide, has its southern end opposite the town of Dunedin. Its surface is of sand, somewhat thickly clothed with the characteristic sand-loving vegetation of the west coast keys. On the mainland east of the town, which is situated in a noted citrus-growing district, are numerous small lakes or ponds, some of which become almost extinct during the dry or winter season. Along the margins of these ponds and in and about the wet hammocks, which are densely grown up with deciduous trees and underbrush, most of the species noted have been taken. My collecting has been done between Oct. 20 and April 15, though a few species are included which were taken in summer and sent to me.

Scarites californicus Lec.—I regard this as a valid species. It can be separated at a glance from *subterraneus* Fab., of which it has been placed as a variety by Leng and other recent writers. It is strictly maritime, occurring only beneath seaweed or half-buried

logs, rarely on the beach of the bay, more frequently on that of the Gulf, where 12 specimens were taken in several hours' search on March 25, beneath thick masses of seaweed along Hog Island. Since *californicus* has never been recorded as mating or even associating with *subterraneus*, and since the latter is an inland form occurring usually in or about the margins of cultivated grounds, the two, in my opinion, are distinct and separate species.

Tetragonoderus fasciatus Hald.—Among a number of beetles taken by my son and his wife at electric light on the porch of my residence at Dunedin, in June and July, 1915, was a single one of this species. It is not included in Leng's "List of the Carabidæ of Florida,"* he merely stating that one had been taken in Mobile County, Alabama, by Loding. It is frequent in sandy places in Indiana, and Horn gives its range as Michigan and New York to Louisiana and Lower California.

Lebia pulchella Dej.—Single specimens of this handsome Carabid were taken beneath boards along the margins of ponds on Jan. 16 and April 4. Schwarz has taken it at Ft. Capron and Tampa, but it is rare wherever found.

Agonoderus indistinctus Dej.—Single specimens were taken at Dunedin, March 28 and Sanford, March 24. Not included in Leng's list.

Haliplus punctatus Aube.—A single example of what I take to be this species, judging from the translation given by Roberts† of Aube's original description, was taken Jan. 30 from a pond in an old clay pit. It is not any one of the species described by Matheson,** and so was sent to that gentleman for examination. He pronounced it a new species, but as he and Roberts disagreed as to what the *H. punctatus* of Aube really is, I place it under that name provisionally.

Peltodytes oppositus Roberts.—Several specimens were taken from ponds and ditches between Feb. 10 and April 2. This and the preceding are the only two species of the family so far taken in the vicinity of Dunedin.

Notomicrus nanulus Lec.—This minute Dytiscid was taken

*Bull. Am. Mus. Nat. Hist., XXXIV, 1915, pp. 555-601.

†Journ. N.Y. Ent. Soc., XXI, 1913, 95.

**Loc. cit., XX, 1912, 156-193.

from a pond east of Dunedin on Jan. 19 and Feb. 9, 1913, eight specimens having been secured. It has not since been found though especial search has been made for it. It occurs on the underside of wholly immersed boards, and is only detected when it moves. LeConte described it from Louisiana in 1863, from specimens taken by Dr. Schaum, and it has not before been recorded from Florida.

Philhydrus estriatus, sp. nov.—Broadly oblong-oval, feebly convex. Above black, shining, the side margins of thorax and elytra reddish-piceous; under surface dark piceous, the antennæ, palpi and tarsi paler. Thorax and elytra very finely, rather closely and evenly punctate, the elytra without trace of sutural striæ, each with two irregular rows of large punctures located along the lines of the fifth and seventh striæ, were the latter present. Under surface finely and very densely punctate. Mesosternal crest low with front edge strongly oblique. Length 6.5 mm.

Described from three specimens taken from ponds on Jan. 21 and March 23. Intermediate in size between *consors* and *perplexus* of LeConte, being smaller and much less convex than *consors* and larger and more broadly ovate than *perplexus*. In both those species the punctuation is much coarser, the sutural striæ very distinct and the coarser punctures of elytra in four rows. From *P. cinctus* Say, which it resembles in colour, *estriatus* is separated by its less convex form, absence of sutural striæ and oblique front edge of mesosternal crest.

Helocharis maculicollis Muls.—A female of this species, taken Feb. 25, had a large mass of eggs attached to the under side of the abdomen. They were very regularly placed in a double layer, the median portion of 12 eggs consisting of two rows, each made up of three eggs placed end to end. On each side of this longitudinal median axis and arranged at right angles to it were two rows, each composed of nine eggs placed side by side. There were thus 36 eggs in the double layer each side of the median support, or 84 in the whole mass. I can find no previous record of the egg-bearing habit of this species.

Arthmius gracilior Casey.—Taken in some numbers by sifting vegetable mould in a low, wet thicket. Originally described from Tampa, it was placed as a synonym of *Batrisus globicollis*

Lec. by Henshaw, but Fall, in a recent letter, states that the sexual characters are different and that it is probably distinct.

Exochomus marginipennis childreni Muls.—This variety is common on oak throughout the winter, and mention is made of it here only to record the taking of two specimens having the elytra wholly pale, the usual subapical black spots being absent.

Hyperaspidius militaris Lec.—Schwarz records this species as "rare on oak shrubs." About Dunedin it is swept in numbers in late autumn and early spring from a species of *Helenium* and other low Compositæ, and has never been taken from oak.

Scymnus oculatus, sp. nov.—Oval, convex. Head, thorax, legs and last ventral wholly pale yellow; under surface reddish yellow, finely and densely punctate; elytra black with a large oval, common reddish spot on median third. Upper surface rather thickly clothed with very fine semi-prostrate whitish hairs. Thorax almost smooth; elytra coarsely not closely punctate. Length 1 mm.

Described from a single specimen beaten from *Myrica cerifera* L. on March 24. A small and uniquely coloured species belonging to Horn's Group B, i. e., having the metacoxal line running parallel to the first ventral suture. Neither Horn nor Casey describe a form having a single common elytral pale spot, hence I have little hesitation in adding a new member to this already over-crowded genus.

Tritoma dissimilis, sp. nov.—Elongate-oval, feebly convex. Black, legs, antennæ and palpi reddish brown. Head and thorax sometimes piceous, minutely alutaceous, finely and sparsely punctate; sides of thorax straight from base to apex. Elytra slightly wider at base than thorax, widest and most convex at basal third, thence tapering to the rounded apex; striae with feebly impressed rows of small, close-set punctures; intervals very minutely and sparsely punctate. Under surface finely and sparsely punctate. Length 4-4.5 mm.

Taken from beneath bark of dead oak; March 23, 24. Close to *T. angulata* Say but larger, with distinctly longer and more tapering elytra and straighter sides of thorax.

Tomarus hirtellus Schwarz. Frequent beneath piles of chips and old leaves. Not listed by Henshaw though it was described in 1878.

Dermestes elongatus Lec. A single specimen was taken from beneath the carcass of a gopher turtle on March 8. LeConte described it from Georgia as rare, and Schwarz records one specimen from Haulover, Florida.

Monædus guttatus Lec. Taken in numbers Feb. 23—29, and again December 13, by beating masses of a very slender milkweed, *Metastelma scoparium* Nutt., near the border of a wet hammock. Horn in 1882* characterized the genus *Monædus*, placing it in the family Lathrididæ, and described *M. guttatus* (crediting the species in a footnote to Dr. LeConte) from "a single specimen taken by H. G. Hubbard at Cedar Keys, Fla."**

In 1894 Sharp erected the family *Adimeridæ* for a supposed new genus, *Adimerus*, of which he described three species from Central America.† Arrow in 1909 states‡ that *Adimerus* Sharp (1894) is a synonym of *Monædus* Horn (1882), and corrects Horn's mistake regarding the number of tarsal joints. He retained the family name *Adimeridæ* and listed five species of *Monædus*. In 1913 Champion‡‡ accepted Arrow's conclusions regarding the synonymy of *Adimerus* and placed *M. dubius* Sharp as a synonym of *M. guttatus*, but still retained the family name proposed by Sharp.

In conformity with Article 5 of the International Rules of Zoological Nomenclature the family name *Adimeridæ* Sharp should be abandoned, being based on a generic name which was a synonym, and should be replaced by *Monædidæ*, with *Monædus* Horn as the typical genus.¹ The genus is represented in Guadeloupe and Central America by several species which are said to occur under bark. *M. guttatus* is represented in the U. S. National Museum collection by three specimens from Florida, all taken by Hubbard and Schwarz at Biscayne on May 10; also by specimens from Tampico, Panama, Cuba, Guatemala and Monteserrat.²

*Trans. Amer. Ent. Soc., X, 116, Pl. IV, fig. 10.

**Mr. H. S. Barber, in a recent letter, states that Mr. Schwarz "averts that *guttatus* was not taken by either Hubbard or himself at Cedar Keys, but that the type specimen came from Jupiter, Fla."

†Biol. Cent. Amer., Col., vol. II, pt. 1, 441, Pl. XIV, figs. 3, 3a and 4.

‡Ann. Mag. Nat. Hist., IV, 195.

‡‡Trans. Ent. Soc. London, 73.

¹ Since this was in type Mr. Barber has called my attention to the fact that Leng and Mutchler (Bull. Am. Mus. Nat. Hist., vol. 33, p. 415) have used the family name *Monædidæ* for four species of *Monædus* from Guadeloupe.

² Auct. H. S. Barber, to whom I am also indebted for several of the citations above given.

Tenebroides foveatus, sp. nov. Elongate-oblong, subdepressed. Black, feebly shining, antennæ, palpi and tarsi piceous. Head finely and rather sparsely punctate, vertex with a large, rounded median fovea. Thorax subquadrate, slightly wider than long, sides almost straight, feebly diverging from base to apex; disc sparsely and finely punctured, hind angles almost rectangular. Elytra at base not wider than apex of thorax, sides parallel to apical third, thence broadly rounded to apex; striæ with rows of unimpressed, medium sized, close-set, round punctures; intervals flat, smooth. Under surface finely and sparsely punctate. Length 10 mm.

One specimen taken at light on porch of house, July 5. Its large size, foveate head and flat, smooth intervals distinguish it from our other described forms.

Lacon curtus Lec. Taken in small numbers on several occasions from beneath logs half buried in dry sand. From three to a dozen are usually found together. Originally described from Georgia, it is not given in Schwarz's "Coleoptera of Florida," though he lists *L. rectangularis* Say as common. I have not seen the latter species in Florida, and Dr. Schwarz may have been mistaken in his identification.

Elater discoideus Fab. A single specimen of this handsome Elaterid was beaten from the bayberry, *Myrica cerifera* L. on Feb. 23. Its range is given as Canada to Georgia, and no previous Florida record can be found.

Cebrio mandibularis Lec. Two specimens of this interesting species were taken at light on June 15, as was also one of *C. bicolor* Fab. The latter species is the only one listed by Schwarz, though LeConte's species was described from Florida in 1865.

Pyractomena lucifera angustata Lec. In 1851 LeConte described* *Pyractomena angustata* from the "Southern States," and stated that: "The thorax is usually longer than wide; in one specimen (probably distorted) the reverse is the case." His species was afterward, by himself and Henshaw, placed as a synonym of *P. lucifera* Melsh. Among the specimens of Lampyrids taken at Dunedin and Eustis, Fla., are three males having the thorax distinctly longer than wide and its sides perfectly straight and parallel

*Proc. Acad. Nat. Sci. Phil., 1851, 336.

from the base to beyond the middle, then strongly oblique to the obtusely angulate apex. In all specimens of *lucifera* at hand, from Indiana and Florida, the thorax is fully or quite as wide as long, with sides more or less curved or oblique from base to apex. The elytra of the Dunedin and Eustis specimens are more distinctly granulate-punctate, and the seventh ventral segments are narrower than in the true *lucifera*. With the belief that these specimens represent at least a distinct variety and that they are probably the same as LeConte's *angustata*, I have restored his name as above given.

Telephorus albolineatus, sp. nov. There has long been confused with the *Telephorus rectus* of Melsheimer, a form which I here separate and name as above. The body is distinctly narrower and has the thorax narrower with sides more curved and apex more rounded than in *rectus*. The black median stripe of the thorax is narrower, with its sides less irregular than there. The elytra are more coarsely, rugosely punctate, are clothed with coarser pubescence and have the suture and side margins narrowly but wholly pale. Legs black, the femora sometimes with basal third yellowish. Length 5-5.5 mm.

Common at Dunedin in March and April, where it occurs on oak, bay and other foliage in wet hammocks. Sanford, March 27. A very closely related, if not the same species, occurs in the tamarack marshes of northern Indiana. LeConte had this species before him when he wrote his second paper on Lampyridæ,* and placed it as "variety" B of *rectus*. I have not as yet taken the true *rectus* in Florida.

Disonycha abbreviata leptolineata, var. nov. During the winter months there occurs in small numbers beneath boards and chunks along the borders of lakes and ponds near Dunedin a form of *Disonycha*, which is evidently an undescribed variety of *D. abbreviata* Muls., if not a distinct species. It differs from northern specimens of *abbreviata* in having the body a brighter red, the antennæ deep black, not piceous, and especially in having the black lines of elytra very narrow, not over one-half the width of those of *abbreviata* and more finely punctate than there. In size, form and structure there appears no difference, hence it may for the present be regarded as a southern colour variety of that species, though Horn in his "Halticini" says of *abbreviata*: "This is one of the least variable of our vittate species."

*Trans. Amer. Ent. Soc. IX, 1881, 52.

SOME EUGLOSSINE BEES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The Euglossines are perhaps the most brilliant of all bees, and appropriately, many of them seem to visit the magnificent orchids of the South American forests. I have recently had occasion to study some previously unnamed Euglossines in the U. S. National Museum, and the results are presented herewith:

***Eufriesia purpurata* (Mocsary).**

I have a male from F. Smith's collection, labelled *Euglossa brullei* Lep., but it does not at all agree with the description of that species, and is a *Eufriesia*, related to *E. pulchra* (Sm.). The locality is S. Paulo, Brazil. It agrees well with *E. purpurata* (Mocs.), and is referred to that species. Mr. Meade-Waldo, to whom I wrote concerning the matter, replied that in the British Museum they had four specimens under *E. brullei*, "all with dark heads and thorax, and abdomens varying from reddish-bronze to almost clear green." He also objected to the reference to *E. purpurata*, since Mocsary's figure (which I have not seen) represented it as having the "head, thorax and abdomen totally reddish-bronze." The description, however, as quoted by Friese, agrees with my specimen. It is stated that the abdomen (excepting the first segment) is "viridi- vel igneo-auratis," as in the British Museum so-called *brullei*. In my specimen it shines copper-red and golden-green in different lights.

***Euglossa* subg. *Glossura*, n. subg.**

Mouth-parts extremely elongated, extending far beyond apex of abdomen; scutellum bigibbous. Type *Euglossa piliventris* guerini. Also includes *E. ignita* Smith.

***Euglossa piliventris* Guérin.**

Bartica, British Guiana, May 17. (U. S. N. M.) I have one from Maroni.

***Euglossa bicolor* Ducke.**

Near Para, Brazil (Miss H. B. Merrill, U. S. N. M.). The sides of the thorax and the last three abdominal segments are green.

***Euglossa mandibularis* Friese, var. *bernardina*, n. var.**

Male. Face and front golden-green, vertex blue-green; mandibles with a minute, cream-coloured spot at base, and a larger one on malar space; thorax and abdomen above shining greenish

blue. As Friese notes, this has very nearly the general form of *E. piliventris*, with bigibbous scutellum. The mesothorax is shining, with minute punctures, not very dense on disc. The mouth-parts do not reach to the end of the abdomen. There is a minute, black fleck in middle of scutellum. The labrum is broader than long, the reverse being the case in *E. piliventris*; and the cream-coloured band at lower sides of face extends broadly from orbits to labrum, whereas in *piliventris* it forms an L-shaped mark.

Hab.—San Bernardino, Paraguay, Oct. 4. (K. Fiebrig; U. S. N. M.) This is very distinct from all species I have seen, but the specimen appears to represent a colour-variety or race of *E. mandibularis*. Friese's description of *mandibularis* omits some of the salient characters of our insect, so it is possibly a different species, to be called *Euglossa bernardina*.

***Euglossa variabilis* Friese.**

Friese separated *E. variabilis* as a species very closely related to the common *E. cordata* L., but distinguished by the more shining, less densely punctured thoracic dorsum. He considered it to be very variable, and named three varieties. Ducke, on reviewing the subject, referred most of Friese's *variabilis* back to *cordata*, but separated one of the varieties as a species, *E. azurea* Ducke. Since this appears to be Friese's *E. variabilis* var. *cyanea*, it is presumably to be called *E. cyanea* (Friese). So far as I am able to judge, *E. variabilis* (excluding *cyanea*) is sufficiently distinct for recognition, and it even seems probable that the varieties deserve specific rank. There is certainly much individual variation in colour, but series collected at the same time and place present a recognizable facies.

***Euglossa variabilis*, var. *mixta* Fries**

Females, collected by Aug. Busck in the region of the Panama Canal, are labelled Tabernilla, July 21, and Cabima, May 21. Another comes from Las Cascadas, collected by A. H. Jennings. The abdomen is variably but always evidently suffused with copper-red or carmine. The insects are a little larger and more robust than the next variety.

***Euglossa variabilis*, var. *purpurea* Friese.**

Friese says the entire body is purple-red. The insects before me are green, suffused with copper-red, but it seems probable that

Friese's type was merely an extreme example of the same race. The specimens seen are from Costa Rica, with the following data: male, Sixola River (Wm. Schaus); female, Pozo Azul, June 5 (M. A. Carriker).

Euglossa variabilis, var. **hemichlora** n. var.

Female. Like the Costa Rica form just mentioned, but abdomen almost pure green, contrasting with the coppery thorax. The small size (as compared with *mixta*) agrees.

Hab.—Paramba, Ecuador, April, from W. F. H. Rosenberg. (U.S.N.M.) If we regard *mixta* and *purpurea* as species, *hemichlora* is a colour-variety of *purpurea*; but if it turns out that Friese's extreme *purpurea* form is specifically distinct from the Costa Rica insect, then *E. hemichlora* will be the name for the series represented by the Costa Rica and Ecuador specimens before me.

Euglossa cyanura, n. sp.

Female.—Length about 10 mm.; like a small *E. variabilis*, but head and thorax brilliant emerald green, abdomen splendid purple-blue, green at base and apex; black tuft or fleck on scutellum very large, extending from apex three-quarters of distance to base; ocelli much closer together than in *variabilis*, the posterior ones separated by a distance only equal to the diameter of one; labrum very short, the dark spots nearly circular; punctures of mesothorax sparser than in the Costa Rica *purpurea*.

Hab.—Porto Bello, Panama, Feb. 24, 1911. (Aug. Busck; U. S. N. M.)

Euglossa charapensis, n. sp.

Female.—Length about 12 mm.; like *E. cordata*, but distinctly larger and more robust; wings very brown; scutellum more densely punctured, shorter in proportion to its width, less filled out at sides posteriorly, and with the black tuft large and broad, extending as in *E. cyanura*; apical part of abdomen with very strong copper-red tints. The face is distinctly broader than in *cordata*.

Hab.—Rio Charapé, Peru, Sept. 17, 1911, (C. H. T. Towns-end). This may possibly be Friese's *E. cordata* var. *aureiventris*, but Friese gives no particulars except that the abdomen is shining golden-red, so his insect presumably has the structure of true *E. cordata*. *E. cordata* extends right across South America; I have it from Bahia on the east, and Ecuador on the west.

ON THE SYNONYMY OF *DELPHAX MAIDIS* ASHM.

Through the kindness of Dr. L. O. Howard and the courtesy of the National Museum, Washington, D.C., I have been able to examine a male cotype of *Delphax maidis* Ashm., and can now state definitely that it is synonymous with *Pundaluoya simplicia* Distant. Unfortunately I have not been able to examine a male specimen from India, but Mr. Distant has stated that the Hawaiian and Indian specimens are the same species. I have not seen the type of *Delphax psylloides* Leth., but from the description and figures I conclude that it is the same as *D. maidis* Ashm. It is true that the figure shows no spur on the hind tibia, but this should not over-ride the other characters or the fact that Lethierry placed it in Delphacidae. Green's description of the habits confirm me in this conclusion.

I have now examined specimens of this species from North America, Hawaii, Fiji, Australia, Amboina, Java, Philippines, Formosa, Malay Peninsula and British India. It is also recorded from Ceylon, Seychelle Islands, West Africa, Cuba, Nicaragua and Brazil. Which of these places is the natural habitat I am unable to say, for in the Malay Archipelago and the Philippines it lives on native grasses as well as *Zea mays*.

I have not seen specimens of *Pundaluoya ernesti* (Kirk.), but from the figure and description I am unable to place it in the same genus with *D. maidis* Ashm. I recognize Kirkaldy's genus *Peregrinus* as distinct from *Liburnia*, and therefore consider the following as the correct synonymy:

***Peregrinus maidis* (Ashm.) Kirk.**

Delphax maidis Ashmead, 1890. Psyche, p. 323.

Delphax psylloides Lethierry, 1894. Indian Museum Notes, p. 105.

Dicranotropis maidis Van Duzee, 1897. Bull. Buffalo. Soc. Nat. Sci., p. 240; Van Dine, 1911, U.S. Dep. Agr., Bur. Ent. Bull. 93, p. 34.

Peregrinus maidis Kirkaldy, 1904. Entom., p. 175; 1906, Haw. Sugar Planters' Assn. Ent. Bull. I, p. 407; 1907, op. c. III, p. 132; Van Duzee, 1907, Bull. Buffalo Soc. Nat. Sci., p. 43.

Pundaluoya simplicia Distant, 1906. Faun. Brit. Ind. Rhyn., III, p. 468; 1916, op. c. VI, p. 134.

Honolulu, Dec. 1, 1916.

F. MUIR.

A NEW MARITIME ANTHOMYID (DIPTERA).

BY CHARLES W. JOHNSON, BOSTON, MASS.

Phyllogaster robustus, sp. n.

♂. Face silvery white, front brownish and occiput grayish pollinose, antennæ, aristæ, palpi and proboscis black, arista pubescent, thickened near the base. Thorax grayish with three conspicuous brownish lines when viewed from behind, all the bristles prominent, dorso-centrals three, scutellum with two large apical and one lateral bristle. Abdomen grayish, an interrupted blackish median line and large blackish spots on the sides of the second and third segments near the posterior margins, hypopygium prominent, the subanal, phylloid; appendages which extend posteriorly from beneath the third ventral segment are broad and slightly contracted near the middle. Legs black, only the extreme tips of the femora and bases of the tibiæ yellowish, halteres yellow. Wings grayish hyaline, veins dark brown, squamæ white. Length 7 mm.

♀. Similar to ♂, front slightly wider, about one and one-half times as wide as each eye. The blackish abdominal markings are as conspicuous as in the male, the end of the ovipositor is grayish and armed with two hook-like spines. Length 8 mm.

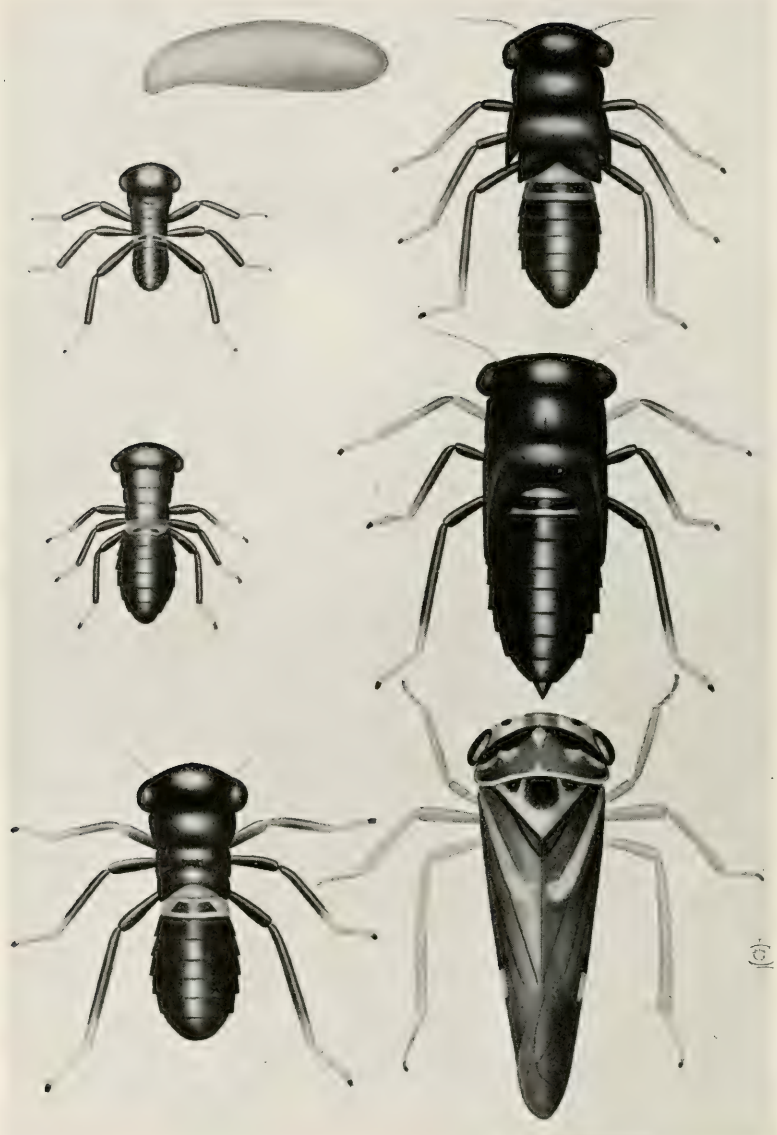
Holotype and allotype, Edgartown, Mass., June 29, 1910; two paratypes, Chatham, Mass., June 30 and July 1, 1904; and two paratypes, Buttonwoods, R.I., June 17, 1912, in the collection of the Boston Society of Natural History. Paratypes from the above localities are also in the Museum of Comparative Zoology, American Museum of Natural History, Academy of Natural Sciences, U. S. National Museum, and the collections of Dr. J. M. Aldrich and the author.

This is one of the most conspicuous of the group of Anthomyids that frequents the grayish sandy beaches of our coast. Its larger and more robust appearance, darker legs and more prominent abdominal markings, readily distinguish it from *Phyllogaster cordyluroides* Stein.

Dialyta flavitibia Johannsen.

This species, which has quite recently been described by Dr. O. A. Johannsen, from the Adirondack Mts., N. Y. (Trans. Amer. Ent. Soc., XLII, 394, 1916), is quite widely distributed. I have collected it at Machias, Me., July 21; Brookline, July 7; Plymouth, July 28, and Cheshire, Mass. Also at Danbury, Conn., June 15, and Ricketts, North Mt., Pa., Sept. 1. I have received it from Winchendon, Mass., July 1 (A. P. Morse); Colebrook, Conn., July 20 (W.E. Britton), and Kearney, Ont., July 7, 1909 (M. C. Van Duzee).

Mailed April 7th, 1917.



IDIOCERUS FITCHI VAN D., EGG, NYMPHS AND ADULTS. (P. 153.)

The Canadian Entomologist.

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No. 5

POPULAR AND PRACTICAL ENTOMOLOGY NOTES ON THE BLACK APPLE LEAF-HÖPPER.

(*Idiocerus fitchi* Van D.)

W. H. BRITTAİN AND L. G. SAUNDERS,* TRURO, N.S.

Originally described by Fitch from New York State, this insect apparently occurs quite generally throughout the North-eastern United States and Canada. It is very common throughout the Annapolis Valley of Nova Scotia.

INJURIES.

Many farmers who have noticed this insect at work, have considered it to be a pest of some importance. Most of the injuries that they have attributed to its agency, however, have been brought about by other causes. Where numerous, the insects swarm over the new growth and particularly about the blossom clusters, where they may easily be observed feeding. Though unquestionably some damage results from their work, it is apparent, from a careful study of their feeding habits, that they are of little importance as fruit pests. Numbers of the nymphs were placed on apple seedlings, and their effect on the plants noted. There was no noticeable curling or blotching of the leaves as a result of even a relatively large number of nymphs on a small seedling. The only effect that could be seen, was that occasionally a bead of clear sap would be seen oozing through a punctured blossom pedicel or leaf petiole. This might eventually result in the withering and dropping off of the affected part. It was evident, therefore, that the damage done was not serious, and that the presence of the pest in the orchard, even in large numbers, did not justify the alarm sometimes caused by its appearance.

DESCRIPTION OF LIFE STAGES.

Egg.—Length .065 to 0.737 mm. Width 0.167 to 0.187 mm. Elongate, more or less cylindrical; widest near posterior extremity,

* Contributions from Entomological Division, Nova Scotia, Department of Agriculture.

which is rather broadly rounded; rather strongly curved near apex on one side; apex sharply curved on this side, broadly rounded on the opposite side; colour whitish; chorion smooth and shining.

Stage I.—Length 1.24 to 1.82 mm.; width of head including eyes .52 to .56 mm. General colour shining black. Eyes dark red. Head short and wide, broadly rounded before eyes. Thorax with fine yellowish median longitudinal line. First abdominal segment yellowish, with broad, dark brown band slightly procurved, not reaching lateral, posterior or anterior margins. Second segment sometimes yellowish, on posterior margin. Abdomen with numerous long, stout hairs regularly placed. Legs shining brownish black; coxæ, trochanters and tarsi pale yellowish, excepting tip of claws which are brownish black. Antennæ pale yellowish, basal segment darker, almost brown. Short, stout hairs on the entire length of tibiæ, and a very few on the femora.

Stage II.—Length 1.48 to 1.75 mm.; width of head including eyes .55 to .6 mm. Head and legs relatively smaller than in preceding instar. Distal third of fore tibiæ yellowish. Tips of tarsi and claws brownish black. Colouring in other respects similar to stage I. Tibiæ very finely pubescent, with a few longer hairs at tip; not clothed for the entire length as in former instar. Entire surface of body and legs very finely granular, producing a less shining appearance.

Stage III.—Length 2.025 to 2.62 mm.; width of head including eyes 1.05 to 1.112 mm. Colouring similar to first two instars, excepting a continued modification of colouring on legs, the fore tibiæ being brownish black on proximal half and yellowish on the remainder, while the distal extremity of the middle tibiæ is yellowish. Wing-pads apparent.

Stage IV.—Length 3.1 to 3.29 mm.; width of head including eyes 1.25 mm. Form and colouring similar to other stages; wing-pads prolonged, mesothoracic pair extending along sides of metathorax for two-thirds their length.

Stage V.—Length 3.65 to 3.82 mm.; width of head including eyes 1.47 to 1.55 mm. Body stouter than preceding stages, lateral margins being almost parallel, slightly the widest at eyes; prothorax a little narrower than head and longer; mesothorax shorter than prothorax and metathorax still shorter. Wing-pads

reaching just beyond articulation of 4th and 5th abdominal segments. Abdomen tapering gradually to 7th segment, thence more sharply to caudal extremity. Abdomen with usual arrangement of short, stout hairs, regularly placed. Last abdominal segment pale dusky yellow. Fore legs pale yellow, very slightly dusky on proximal end of tibiae and claws, others as in preceding instar.

Adult.—The following is the description given by Fitch (1) for this species:

Chestnut-brown varied with white; elytra hyaline, with a large, fuscous spot on the middle and another at the apex of the outer margin, with an intervening white spot; a faint, white spot towards the base of the sutural margin. Length 0.35 mm.

The more complete description of Osborne and Ball (6) is as follows:

Chestnut-brown with narrow, light stripes on pronotum, scutellum, and clavus. Length of female 5.75 mm.; male 5.25; width 1.7 mm.

Face, in the female, chestnut with broad circles around the large, black spots on vertex, and small crescents under the ocelli light yellow; in the male, yellow with a chestnut stripe down the middle and a darker one each side from the corner of the eye down the genae outside the lorae. Pronotum chestnut with a pair of black spots on the anterior margin, the posterior margin and three spots on the disc light yellow, scutellum with the margins and tip light yellow. Elytra brownish, the nervures darker, a narrow, light stripe on the outer margin of clavus, and a hyaline band crossing the apex and broadening towards the costa where it sharply interrupts the broad, dark margin.

Head scarcely wider than the short, convex pronotum, but very deep. The outer anteapical cell short, triangular, the nervure then curving away to the costa. Ultimate ventral segment of the female with the posterior margin rounding, slightly emarginate in the middle; male valve with the posterior margin acutely triangular, the sides concave.

FOOD PLANTS.

Fitch (1) records this species as having been taken on thorn bushes, and Osborne (7) reports it from the hawthorn and crab.

In Nova Scotia it is most common on pears and apples, swarming over the trees in large numbers during the spring and early summer.

LIFE-HISTORY.

The emergence of the nymphs from the eggs commences several days before the apple blossom petals open, and continues for some time after they fall, a period, speaking generally, including the latter part of May and the first part of June. The duration of the nymphal stage is from 7 to 8 weeks.

Some days after emergence copulation takes place, and shortly after this, the eggs are laid. Selecting a suitable place, most frequently in the fruit spur, or a roughened surface on one of the smaller twigs, the female makes a puncture with her beak. She then draws herself forward and inserts her ovipositor in the spot, remaining thus for several minutes. She then removes her ovipositor, rests for several minutes, and selecting another suitable location, repeats the process.

There is only one brood a year, the winter being spent in the egg stage.

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EXPLANATION OF PLATE IX.

Idiocerus fitchi.—Fig. 1, egg; figs. 2, 3, 4, 5, 6, first, second, third, fourth and fifth stage nymph; fig. 7, adult.

THE INSECT COLLECTIONS OF CANADA. I.

THE COLLECTIONS OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

BY C. J. S. BETHUNE, GUELPH.

When the Entomological Society of Ontario was organized in April, 1863, one of the objects set forth in its constitution was the formation of a general collection of insects. During the following year the records show that a cabinet of seven drawers was presented by Professor Croft, the President, and nearly 1,700 specimens were contributed by seven members. At another meeting held during the same year over 600 specimens, belonging to various orders were added to the collection. An excellent beginning was thus made through the generosity and enthusiasm of the members.

In December, 1869, the Society received a grant of \$400 for the year 1870, from the Board of Agriculture and Arts Association of Ontario, on condition that it "furnished an Annual Report, formed a cabinet of insects useful and prejudicial to agriculture and horticulture, and continued the publication of the *Canadian Entomologist*." In fulfilment of these conditions the first of the Society's Annual Reports was published and a cabinet of insects, arranged from an economic point of view, was prepared and placed in the rooms of the Association in Toronto. What became of this collection the writer has been unable to ascertain.

Being now possessed of an annual income, the Society made a grant of \$75 to the London Branch towards the purchase of a cabinet. With this aid the Branch procured a large, black walnut cabinet containing forty-five drawers and proceeded gradually to fill it with an excellent collection. It now forms part of the Society's property and occupies a place with the rest of our material in the Museum of the Ontario Agricultural College. A cabinet

of fifteen drawers, filled with specimens, was bequeathed to the Society by its first Curator, the late Rev. James Hubbert.

In 1875 the attention of the Society was drawn to the desirability of sending a collection of Canadian insects to the Centennial Exhibition to be held at Philadelphia during the following year, and measures were taken to carry the project into effect. Aided by a grant of \$500 from the Commissioners appointed by the Dominion Government, the work was entered upon with great activity by the members resident in London. A specimen case of the kind used at the Museum of Comparative Zoology at Cambridge, Mass., was procured from Dr. Hagen, and a large number of similar style were constructed. A supply of sheet cork, of double the ordinary thickness, for lining the cases was obtained from England. All the members in London who had collections generously placed them at the disposal of the Committee who had charge of the work, and many others, resident in different parts of Ontario and Quebec, liberally assisted in supplying specimens to fill any requirements for the completion of the exhibit.

The work went on during many months, and in the spring of 1876 the collection was completed and sent to Philadelphia, where it arrived without injury to a single specimen. It consisted of eighty-six cases, forty-five of which were filled with Lepidoptera, twenty-seven with Coleoptera, three with Hymenoptera, five with Neuroptera (including the Odonata and some other orders), two with Hemiptera, three with Diptera and one with Orthoptera. When spread out in the Agricultural Hall they formed a double row more than seventy-five feet long and presented a very attractive appearance.

In order to ensure correctness in naming, all doubtful specimens were submitted to specialists as far as possible. Mr. A. R. Grote, the leading authority on the Lepidoptera, twice visited London, and on each occasion spent some days in carefully going over the collection. The Coleoptera were largely named by Dr. G. H. Horn, the Geometers were submitted to Dr. A. S. Packard, and the Neuroptera were identified by Dr. Hagen. The value of the collections for purposes of reference was thus immensely increased. Years afterwards the Noctuids were inspected by Dr. John B. Smith, and he could find but few instances of mis-identi-

fication. The chief credit for the successful accomplishment of this great task is due to the energy and enthusiasm of Dr. William Saunders and Mr. E. Baynes Reed, two of the original members of the Society.

In 1882 a portion of the collection, consisting of forty cases, was sent to the International Fisheries Exhibition in London, England, by request of the Dominion Minister of Marine and Fisheries. It was also sent to the Dominion Exhibition in Ottawa.

In 1886, in compliance with the request of the Dominion Government, and with the cordial approval of the Provincial Government, the whole of the Society's collection of Canadian insects was sent to England to form part of the Indian and Colonial Exhibition. The collection contained over ten thousand specimens, representing the various orders. Two of the cases were broken in transit, and a number of specimens of Lepidoptera were damaged. After the return of the collection to London, Ontario, it was decided that it should not again be sent away for exhibition purposes, in order that any danger of injury or loss might be avoided. From these exhibitions the Society received a number of medals, gold, silver and bronze, and several diplomas.

In 1890 the Society purchased the collections of Mr. Johnston Pettit, of Grimsby. These consisted of a cabinet of twenty small drawers, containing a fairly representative collection of North American Coleoptera determined for the most part by Dr. Horn and other specialists, and, therefore, valuable for reference; there was also a variety of specimens of exotic Lepidoptera and other orders.

The most interesting and probably the most valuable of the Society's possessions from a scientific point of view is the D'Urban collection of Lepidoptera. It consists of a single drawer (No. 16 in the large, walnut cabinet), containing 183 specimens of moths, mostly Noctuids and Geometers. In one corner is pinned the following note by Mr. E. Baynes Reed, dated London, November, 1871: "This collection of Canadian Moths was made by Mr. William D'Urban, formerly a resident of Montreal, but now of Exeter, Devon, England. They were taken to England by him and sent to Mr. Francis Walker at the British Museum for identification. Many of the specimens are the identical types of Mr.

Walker's catalogue. The labels are all in his handwriting. Mr. D'Urban sent the collection to Mr. E. B. Reed who reset them, taking care to preserve the identification. The collection has thus twice crossed the Atlantic."

The re-setting was probably a change from the English custom of pinning low to the use of long pins and to a much higher position.

Dr. J. McDunnough, of Decatur, Ill., has recently inspected the collection and has published a series of notes on a number of the specimens in vol. III, No. 1, of the Barnes & McDunnough, "Contributions to the Natural History of the Lepidoptera of North America."

Mr. D'Urban published "A systematic list of Lepidoptera collected in the vicinity of Montreal" in *The Canadian Naturalist and Geologist*, vol. V, pp. 241-266, and in vol. VI, pp. 36-42 under the title "Addenda to the Natural History of the River Rouge" (Montreal, 1860-1861) descriptions of new species of Nocturnal Lepidoptera, by Mr. Francis Walker of the British Museum, the types of most of which are in this "D'Urban Collection."

The remaining forty-four drawers of this cabinet contain a variety of very beautiful and interesting specimens from various parts of the world. Fifteen drawers are filled with gorgeous butterflies and moths from India, China, Japan, Africa, South America and the West Indies; six with beetles of wonderful shapes and colours from India, Australia, Africa and South America; two with East Indian Hymenoptera, Hemiptera and Orthoptera; one with tropical Arthropods (scorpions, centipedes, etc.) There are also four drawers of English Lepidoptera and one of Diptera sent by Mr. F. Walker of the British Museum. The remainder are filled with North American specimens from the Southern and Western States, Manitoba (collected by the late Mr. E. F. Heath), some remarkable hybrids of Saturnian moths, silk and cocoons, Insect Architecture, etc.

The most important collections belonging to the Society are contained in one hundred drawers arranged in five double cabinets. Twelve drawers are filled with Butterflies, six with Sphinges, twelve with Bombycid moths, nineteen with Noctuids, six with Geometers and seven with Micro-Lepidoptera. The remaining

thirty-eight are filled with Coleoptera. This is a purely Canadian collection, almost entirely from Ontario. The specimens have in nearly all cases been named by specialists when they were brought together for the Philadelphia Exhibition, and are therefore most valuable for reference and comparison; but unfortunately date and locality labels were not thought of so much importance in those days as they are now, and comparatively few are provided with them.

A walnut cabinet of fifteen drawers contains North American species of Hymenoptera (five drawers). Diptera (two), Neuropteroid insects (two), Odonata (three), Hemiptera (two) and one of Orthoptera. These are for the most part collections made many years ago, with very few recent additions. The Neuropteroid specimens were named by the late Dr. Hagen, of Harvard University. The Society has a very meagre collection of insects outside of the Lepidoptera and Coleoptera, contributions of specimens of any other orders would, therefore, be most acceptable.

In addition to the foregoing, the Society possesses a large number of book-boxes containing a great number of Coleoptera from California, and many specimens of British and exotic Lepidoptera. All the collections are carefully gone over at least twice a year to guard against any injury from Anthrenus or other museum pests.

A NEW SARCOPHAGA FROM NEW YORK.

BY R. R. PARKER, STATE COLLEGE, BOZEMAN, MONTANA.

***Sarcophaga fulvipes dissidia*, n. subsp.**

1914. *Sarcophaga fulvipes nigra** Parker, Proc. Bos. Soc. Nat. Hist., vol. 35, No. 1, pp. 38, 40, 41. Characters.

1916. *Sarcophaga fulvipes* var., Aldrich, *Sarcophaga* and Allies, p. 184.

Holotype ♂.—Collection of C. W. Johnson, Boston, Mass. (♂) Posterior trochanter without "brush;" femur arched, its anterior face without ventral row of bristles (only a single distal bristle present); anterior and posterior faces of tibia each with a

* *S. fulvipes dissidia* was referred to in part one as *S. fulvipes nigra*, but *nigra* has since been found to be preoccupied; therefore, the subspecies is described under the name *dissidia*.

very thick beard of very long, coarse hairs extending full length of tibia; middle femur clothed beneath nearly to distal extremity with long hair, posterior ventral row of bristles represented only by a few short bristles on about distal fifth; tibia clothed beneath on about its distal half with long, dense hair that anteriorly and posteriorly becomes coarser and beard-like, submesotibial bristle absent; vestiture of third ventral plate short and erect; genital segments dull orange, vestiture of both equally long, first large and without marginal bristles (possibly variable).

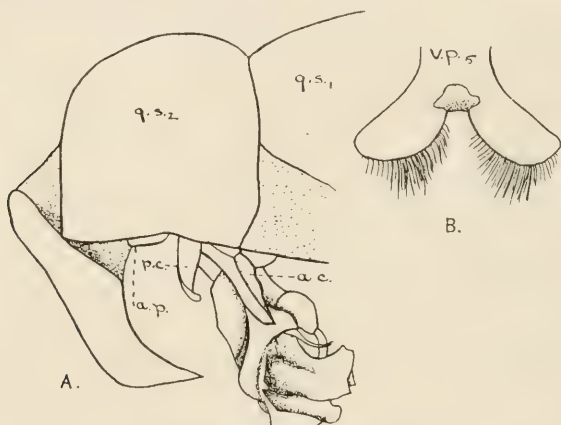


Fig. 7.—*Sarcophaga fulvipes dissidia*, n. subsp. A, Genital segments of ♂; B, fifth ventral plate of ♂.

Head.—Viewed from side, parafrontals and genæ with dark reflections. Breadth of front at narrowest part about three-fifths eye width; cheek height approximately one-third that of eye. Front prominent, sides of frontal vitta slightly converging backward. Second antennal segment dark; third about twice length of second; arista plumose on basal two-thirds. Back of head somewhat convex, with three rows of black cilia behind eyes, otherwise clothed with yellowish white hair that completely covers the metacephalon. Cheeks clothed with black hair. Gena with a single row of bristle-like hairs near lower eye orbit. Palpi dark.

Chaetotaxy.—Lateral verticals absent; vibrissæ inserted just above line of oral margin.

Thorax.—Mesonotum clothed with erect, almost bristle-like

hair. Hairs covering anterior spiracle dark brown basally becoming lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover light yellowish brown with yellowish tips. Epaulets dark.

Wings.—Bend of a fourth vein a right angle; anterior cross-vein more basal than end of first longitudinal; costal spine vestigial; third vein bristly; section III of costa about one and one-fourth times section V; alulae fringed with hair; calypters whitish, margins fringed with white hair.

Legs.—Dark; all tarsi distinctly shorter than their respective tibiae. Posterior trochanter without "brush;" femur cylindrical, arched, clothed beneath with long hair that forms a beard posteriorly; anterior face with but two rows of bristles, an upper and an intermediate, latter not developed distally, of lower row a single distal bristle present; posterior face without ventral row of bristles; tibia curved, anterior and posterior faces each with a very thick beard of very long, coarse hairs extending full length of tibia, latter somewhat the stronger; fourth tarsal segment at least one-half fifth. Middle femur clothed beneath nearly to distal extremity, especially posteriorly, with long hair; anterior ventral row of short bristles complete, posterior row represented only by a few short bristles on about distal fifth; tibia clothed beneath on its distal half or slightly more with long, dense hair that becomes coarser and beard-like anteriorly and posteriorly; submesotibial bristle absent. Ventral surface of anterior coxa with an irregular row of bristles at each side and anteriorly with others between them; tibia with a beard-like line of short hairs distally on posterior face (probably absent in small specimens).

Chaetotaxy.—Anterior dorsocentrals slightly reclinate, not weaker than anterior postsuturals; anterior acrostichal absent; last two pairs posterior dorsocentrals strong, anterior to these several pairs that are mostly very weak and scarcely distinguishable from vestiture of scutum; prescutellar acrostichals present; scutellar apicals present; three sternopleurals, middle one weak; lower sternopleura with a single row of bristles, otherwise clothed with long hair.

Abdomen.—Somewhat conical; clothed above with short, reclinate bristles, beneath with somewhat longer, more erect hair.

Ventral plates as a whole, with their sides slightly converging posteriorly though they may appear approximately parallel; vestiture decreasing in length posteriorly, that of third very short and erect. Posterior margin of fourth notum of same colour as genital segments. Fifth ventral plate (v. p. 5) typical.

Chaetotaxy.—Second segment without marginal bristles, third with two; fourth with complete row ending ventrally in long hairs.

Genital Segments.—Prominent; dull orange; vestiture of both equally long. First (9 s.1), large, in profile slightly arched, marginal bristles absent; second (9 s.2), rotund, not flattened; anal area small, its upper limit not extending to middle of posterior surface. Forceps darkened, tip very strongly bent forward, in profile vestiture extends to forward bend, prongs approximated to bend.

Genitalia.—Head of penis large and its structure complicated. Tips of posterior claspers (a.c. and p.c.) bent forward, flattened dorso-ventrally. Accessory plates hairy (a.c.).

(♀) Not known.

Described from 1 male specimen.

Range.—Type specimen taken at Niagara Falls, N.Y.

Aside from the striking difference between this subspecies and *Sarcophaga fulvipes* (Macquart), the point of greatest interest is the extremely heavy beards of the hind tibiae, which are the most striking of any species known to the writer. The hairiness of the middle tibia is also unusually long and abundant. Considering the extreme weakness of the middle sternopleural bristle, probably specimens will be found with this lacking, in fact, of the two specimens of *S. fulvipes fulvipes* examined, one has two sterno-pleurals on each side, the second two one side, three on the other. Comparatively, the posterior or lower calypter is very large.

The single specimen described belongs to the collection of C. W. Johnson, of Boston, as does one of the two specimens of *S. fulvipes fulvipes* examined. The latter were taken at St. Augustine, Florida. The genitalia of both subspecies are identical in all respects. The advisability of giving this specimen subspecific ranking may perhaps be questioned, but it seemed to me wiser to err in so doing than that such an extreme variation should be lost sight of. It may be a case of melanism.

S. fulvipes fulvipes Macquart differs from the subspecies just described in the following characters; sides of frontal vitta parallel or slightly converging backward (should probably be same variation in *dissidia*); second antennal segment dull orange; palpi light (dull orange); hairs covering anterior spiracle mostly grayish, bases dark; those of anterior margin of posterior spiracle dark at base only; those of spiracular cover yellowish, perhaps faintly darkened basally; epaulets dull orange, brownish basally (*Ravinia*-like); coxæ, trochanters, femora and tibiæ of all legs dull orange, tarsi brown or brownish orange; anterior dorsocentrals not differentiated except that one or two show anteriorly; anterior postsutural dorsocentrals not differentiated; two or three sternopleurals, middle one weak if three are present; first genital segment with or without marginal bristles, if present very slender and hair-like, several each side of centre; forceps only darkened distally.

The most striking of the differences above noted is the dull orange colour of the second antennal segments, palpi, epaulets and first four segments of the legs. Though all the anterior dorsocentrals are differentiated in the subspecies *dissidia*, this may be a variable character; the absence of marginal bristles on the first genital segment may perhaps be variable. In the smaller of the two specimens of *fulvipes* the bearded character of the middle tibiæ is far less distinct, the anterior tibia lacks a beard-like line of short hairs distally, the posterior beard of the hind tibia is much stronger than the anterior, and the ventral surface of the anterior coxa has an irregular row of bristles at each side only.

AN INTERESTING CASE OF INSTINCT.

BY L. M. STÖHR, ST. ALEXANDER'S COLLEGE, IRONSIDE, QUE.

While collecting last fall branches of Sumach which, on account of their great medullar development, often shelter different kinds of aculeate Hymenoptera, I was fortunate enough to find one that furnishes a striking example of instinct. The stalk referred to had been used as a dwelling by several Hymenoptera, as might be seen from the old cells, whose location is still perfectly noticeable. Later on a woodpecker, having remarked the presence

of the insects, helped itself to a meal at slight cost, pecking three holes; one at 18, the other at 22.5 and the last at 30 cm., below the top of the branch. Notwithstanding the precarious condition of the stalk, opened at not less than four points, an insect thought it still serviceable and turned it into a nest for its progeny—and it must be owned, it did it well.

One cell had been built at the bottom of the canal. A piece of resin formed the floor, a transverse partition of the same substance the ceiling. Up to the present time my observations of Hymenoptera making their nests in pithy plants have not yet furnished me with any instances of an Apoid using resin for the construction of partition. A bee, however, it was, since some yellow powder, which remained in a cell, was proved by microscopic examination to be pollen dust. In Europe the *Heriades truncorum* L. is said to use resin for the same purpose.

After this first cell had been constructed, the insect seemed to feel some misgivings concerning the ultimate fate of its progeny, and left unoccupied that section of the tunnel which extended as far as the lowest orifice bored by the woodpecker. Here the wonderful instinct of the bee reveals itself. It placed a first resin stopper just below the level of this aperture, a second one in the hole itself and a third above. The stopper applied to the orifice closes it, but imperfectly, and does not fill the whole tunnel on the inside. But the two other pieces, above and below, are quite cylindrical and close the tube hermetically. All danger of intrusion from below being thus removed, the bee constructed

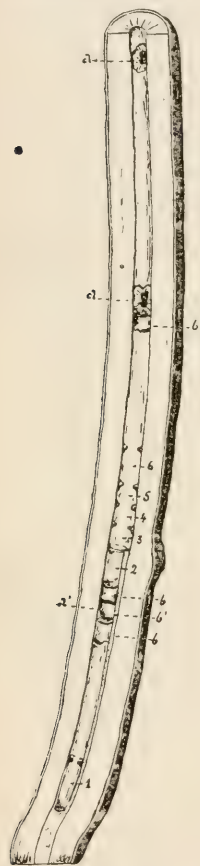


Fig. 8.—a Holes made by woodpecker.
a' Id. covered with pieces of resin (b').
b Pieces of resin forming barricade.
1-6 Cells separated by resin partitions.

five other cells above this barricade. Once more it did not make use of the whole length of the tube between the two lateral openings, but stopped its work 2.5 cm. below the second hole. A straight

resin stopper, the last one, was applied just underneath this hole, and all the rest of the canal, some 24 cm., was left unoccupied. In the accompanying sketch only the section of the branch containing the woodpecker's holes has been represented.

We see here a case in which a Hymenoptera showed remarkable discernment by filling up an accidental opening in the stalk it had chosen as a home for its young, and which, if left open, would have proved fatal for the further development of its progeny. Moreover, the insect stopped its work in time to avoid a repetition of the same labour. Indeed, it is not easy to explain how the offspring—of moderate size as indicated by the length of the cells—could have made their way through a barricade twelve millimeters thick, like the one near the lowest orifice.

Must we now infer that the insect in question proved itself to be endowed with reason and intelligence? The problem has already been solved. Ferton* quotes a case in which an *Odynerus pasictum* L. covered with clay a lateral fissure several centimeters long. He mentions also two instances in which an *Osmia ferruginea* Latr. stopped up in the same way holes in a shell of a *Helix*. The *Osmia cornuta* Latr. in several cases repaired cracks in the walls of its nest. Of six specimens of *Heriades truncorum* observed by him, three filled up fissures with resin.

The above mentioned author infers from these facts that such actions are mere manifestations of instinct, and says in conclusion: "With Hymenoptera, acts of intelligence are exceptional; often those which seem such are nothing else than its manifestations of a habit but seldom remarked."

NEW COLEOPTERA.—VI.

BY H. C. FALL, PASADENA, CAL.

The preceding articles of this series have appeared at intervals from Aug., 1905, to Feb., 1912—under the caption "New Coleoptera, Chiefly From the Southwest." For the present one and any that may follow, the abbreviated title will be used, even though the majority of new species described may still come from the Southwest.

* Ferton: Sur l'instinct des Hyménoptères. Ann. Soc. Ent. Fr., 1901, pp. 142—144.

***Lathrobium shermani*, n. sp.**

Form moderate; reddish brown, shining, pubescent. Antennae rather stout, scarcely reaching the bases of the prothorax, outer joints moniliform. Head as wide as long, a little wider behind, the angles broadly rounded, surface rather sparsely punctate. Eyes wanting, but in their place a small, nearly smooth, whitish spot of about the size of the second antennal joint; beneath sparsely punctate, the gular sutures rather widely separated, most approximate at about the middle of their length, where they are distant by about the width of the penultimate joint of the maxillary palpi. Neck one-half as wide as the prothorax, the latter oblong oval, narrower than the head, longer than wide, just perceptibly narrowed behind, the angles all rounded, the posterior ones a little more broadly so, surface, finely rather sparsely, confusedly punctate, with narrow, ill-defined, smoother median line. Elytra distinctly shorter than the prothorax, humeri small, sides divergent, the width at the apex equal to that of the prothorax, punctures without serial arrangement, coarser than those of the prothorax, mutually distant by their own diameters or a little more; wings undoubtedly vestigial or wanting. Abdomen gradually a little widened to the fifth segment, punctuation finer, not close. Legs concolorous; front thighs stout, broadly angulate subapically beneath; front tarsi broadly dilated, hind tarsi three-fifths as long as the tibiae, basal joint short, terminal joint longer than the two preceding. Length 6.3 mm.; width 1.15 mm. North Carolina, Grandfather's Mt., 4,000–5,000 ft., September. (F. Sherman collector.)

The unique type is a male, having the sixth ventral segment broadly, rather deeply, arcuately emarginate, the segment bearing about the middle of its length on either side of the median line a short, transverse comb of closely placed, porrect, black spinules, about eight in number.

This species is remarkable in being the first blind—or virtually blind—Lathrobiid to be discovered in our fauna. In the European fauna the members of the subgenus *Glyptomerus* are similarly deprived of normal eyes, but the characters of *Glyptomerus*, as given by Casey in his Revision of the American Paderini do not well fit our species. *L. shermani* is perhaps nearest to *Abletobium pallescens*

Casey, in which the eyes, though not lacking, are very small. The species is with pleasure dedicated to its discoverer.

***Tribalister striatellus*, n. sp.**

Rotundate oval, castaneous, moderately shining; above minutely, sparsely, evenly punctulate; elytra 6-striate, the four outer ones subentire, the two inner abbreviated at base; sutural stria punctate, the others scarcely so except near the apex; margin of elytra acute and continuous with that of the prothorax; discal striae entirely without cariniform outer margins. Propygidium coarsely, densely punctate, smoother narrowly along the base; pygidium more finely, sparsely punctate, with intermixed still finer punctures, the latter alone present at apex. Sides of body beneath very coarsely, densely punctate. Otherwise in nearly all respects as in *T. marginellus*. Length 2 mm.; width 1.5 mm.

Rhode Island, Berkley; a single example taken by the writer many years ago under a stone in early spring. It was then identified as probably *T. marginellus*, by Mr. Frederick Blanchard, but a recent comparison with the type of the latter inclines me to the belief that it is specifically distinct. In *marginellus* the upper surface is virtually impunctate except for the coarse punctures along the elytral apex (which are also present in *striatellus*); the so-called elytral striae, after the second, which is very finely impressed, are really not striae at all, but costae, the striae being completely obsolete and traceable only by the slightly different surface lustre along the inner side of the costae; the sutural stria is impunctate, the pygidium is less finely punctate, and the sides of the body beneath are less coarsely and densely so. The region between the hind coxae, involving the apical portion of the metasternum and the basal part of the first ventral segment is broadly depressed—not at all so in *striatellus*. The frontal stria is interrupted medially in *marginellus*, finely impressed and entire in *striatellus*. *Marginellus* was described in 1859, the type being from Maryland, and very few examples have since been taken. *Striatellus* also appears to be excessively rare, and I am not aware that a duplicate exists in collections.

HETÆRIUS.

***Hetærius zelus*, n. sp.**

Oblong, feebly convex above, rufo-ferruginous with fulvous pubescence. Head shining, vertex concave, sparsely punctate,

front and clypeus subimpunctate. Prothorax two-fifths wider than long, disk between the broad impunctate grooves much longer than wide, feebly convex, uniformly rather finely, not closely punctate, each puncture bearing a short, coarse hair; lateral area divided by a deep, transverse sulcus at basal third, the posterior portion globosely convex, rufo-piceous, glabrous, polished, with fringe of hairs along its outer margin; anterior portion slightly narrower than the posterior, of the usual flattened or slightly concave form, sides nearly parallel behind the oblique, apical truncature, surface rather coarsely, closely punctate and pubescent, the hairs becoming denser, longer and recurved along the posterior margin. Elytra slightly wider than the prothorax, one-fifth wider than long, sides feebly arcuate and just visibly converging posteriorly; subhumeral stria two-thirds the length of the elytra, first dorsal nearly attaining the apex, second dorsal three-fourths, and third dorsal two-thirds the length of the elytra, all the striae externally finely cariniform, punctuation fairly close, nearly uniform throughout, hairs short and plumose basally, becoming longer and simple apically where they are intermixed with still longer, sparse, recurved hairs which occur also along the lateral margins. Prepygidium and pygidium sparsely uniformly punctured and setose, the pygidium becoming smooth at apex. Presternum nearly flat at summit, striae sinuate between the coxae, arcuately convergent but not meeting at apical third, interstitial surface nearly smooth posteriorly, becoming closely punctate in front, densely so at apex; sides of prothorax beneath impunctate, numerous punctate in front of the coxae, meso- and metasternum smooth. Legs moderately long, the femora and tibiae sparsely, finely punctate, the latter flattened and expanded as in the allied species. Length (type) 2.25 mm.; width 1.5 mm.; the size practically constant in all examples seen.

Taken at Pasadena, California, October to March, under stones with *Formica pilicornis*. This species is similar to *tristriatus* in a general way, but with elytral striae nearly as in *morsus*, judging from the description of the latter. It is virtually of the same size as *tristriatus*, possibly slightly smaller, and evidently narrower. The cariniform margins of the first and third dorsal striae, which in *tristriatus* are densely squamose throughout their lengths are here not appreciably more densely clothed except near the base of the third stria.

Hetærius strenuus, n. sp.

This name is proposed for a form similar in all general features to *tristriatus* but larger and more densely punctate throughout. In *tristriatus* the head, presternum posteriorly, legs and pygidium are sparsely, finely punctate. In *strenuus* these parts are all rather densely, more strongly punctate. Length 3 mm.; width 2 mm. In *tristriatus* the length is 2.5 mm.

The type bears label—Santa Cruz Mts., California, April 17, 1900. It occurs with a black *Formica* with dark, rufo-piceous legs. A second precisely similar specimen has been taken at Pasadena by Mr. J. O. Martin—March 31, 1916—in whose collection it now is. It, together with one or more examples of *H. californicus* were found under the same stone in nest of what I believe to be *Formica pilicornis*.

H. loripes Csy. The description recently published agrees so perfectly in all respects except the punctuation of the head with *tristriatus*, that it is difficult to believe it can be really distinct from the latter, more especially since it comes from the region inhabited by *tristriatus*.

H. exiguus Mann. I have a specimen of this species collected by Dr. Fenyes, at Porvenir, New Mexico. As Mann's specimens were all taken at Pullman, Washington, I had supposed my New Mexico specimen to be something new until I made careful comparison with a paratype of *exiguus* kindly given me by Mr. Mann.

H. minimus Fall. This little species—described from Colorado—also occurs in New Mexico. It has been taken at "Lower Pecos" by Dr. Fenyes.

SAPRINUS.

Saprinus carinifer, n. sp.

Broadly oval, black, legs dark rufous, upper surface minutely alutaceous and dull throughout. Head finely rugulose. Prothorax twice as wide as long, sides strongly convergent and nearly straight to apical third; surface very sparsely, minutely, nearly evenly punctate, the sides longitudinally rugulose in about the lateral fourth, side margins fimbriate with very short hairs. Elytra across the humeri one-fifth wider than the sutural length, punctuation baso-medially similar to that of the prothorax, the punctures becoming only slightly larger and closer toward the sides, but

evidently though gradually so toward the apex, where they are separated by about their own diameters; dorsal striae obsolete, represented by fine carinae, the sutural attaining the apex but becoming obsolete near the base; fourth dorsal reaching the apical third, joining the obsolete sutural at base; third to first dorsals increasing in length, the last named entire; oblique humeral obsolete, internal subhumeral extending from base to apex, cariniform throughout; external subhumeral short, impressed. Propygidium and pygidium more coarsely and closely, nearly uniformly punctured. Body beneath coarsely, closely punctate at sides, minutely and sparsely so at middle. Prosternum very feebly convex at middle, the striae horizontal, diverging a little before and behind the coxae, broadly arcuately uniting behind the prosternal apex; interstrial area with a few minute punctures. Anterior tibiae quadridentate. Length 3.5 mm.; width 2.8 mm.

California. Described from a single example taken by Mr. G. H. Field in the mountains on the western border of the Colorado Desert. This is one of the finest and most distinct species in our fauna. The posterior tibiae are scarcely as wide as the middle ones, but are hardly narrowed apically. This fact, together with the nearly flat prosternum, indicates a position between Horn's first and second groups; it may, however, with about equal propriety be included in Horn's group IV. The rugulosity at the sides of the thorax is not due to the increase in size or longitudinal confluence of the punctures; the latter are scattered over and between the rugulosities and remain about as minute and sparse as at the middle of the disk.

***Saprinus ciliatoides*, n. sp.**

Closely related to, and very like *ciliatus*, but on comparison with type of the latter seems distinct by its larger size and generally sparser, more minute punctuation. In the type the elytra are as Horn describes them, "densely aciculate punctate at sides and apex," the punctures well separated only in the baso-sutural region and narrowly along the suture posteriorly. The punctures are in general elongate, a tendency that is evident even where they are sparsest. In the present species the punctures are everywhere nearly round, very sparse and fine on the disk, and even where closest, as at the sides and apex, they are rarely much closer together than

their own diameters. The form, colour, striae, prosternum, etc., are virtually as in *ciliatus*. Length 3.2 mm.; width 2.5 mm. (Length of *ciliatus* 2.5 mm.)

Nevada, Las Vegas. One specimen. I have seen another, apparently the same, placed with the type of *ciliatus* in the Le Conte collection; it was taken by Crotch near San Bernardino, California.

Saprinus martini, n. sp.

Moderately robust, brownish piceous with faint aeneous lustre, integuments polished. Head densely punctate. Prothorax ciliate at sides, densely punctate in front and at sides, becoming rapidly but not abruptly smooth in the baso-medial region; the posterior margin punctate. Elytra moderately, strongly and closely punctate throughout, except between the sutural and fourth dorsal striae, the smooth area rather well defined but not sharply limited behind, the punctures extending further forward within the fourth stria than along the suture. First and second dorsal striae attaining the apical third, third and fourth dorsals sub-equal and shorter, sutural entire and joining the fourth dorsal; internal subhumeral oblique, continuous with the humeral, parallel with and as long as the first dorsal; external subhumeral short, distinct from the marginal. Propygidium and pygidium densely but not confluent punctate, the punctures becoming finer at the apex of the latter. Prosternum rather strongly convex but not compressed, the striae divergent and terminating in foveae, which are more remote than usual from the prosternal apex. Margin of front tibiae about 6-denticulate, each denticle bearing a stout spinule. Length 2.4-3 mm.; width 1.8-2.2 mm.

California. Described from two examples taken by Mr. J. O. Martin in Palm Canyon, on the western border of the Colorado Desert. This species is of the same form and general appearance as the common *fimbriatus*; this latter, however, having the prosternum compressed, belongs to a different group. *Martini*, by its prosternal character, belongs to Horn's group VI. and by the ciliated margins of the prothorax is nearest *ciliatus*. In the latter the punctuation of the elytra is more aciculate, the second dorsal stria shorter than the third, and the prosternal foveae are less distant from the apex.

Bactridium californicum, n. sp.

Similar in general appearance to *striolatum*, to which it is

most nearly allied by the characters used in Horn's table.* Form a little less robust than in *striolatum*; colour reddish brown, the elytra more rufous, with a small, diffuse, darker scutellar spot and the apical third, piceous; antennæ and legs rufotestaceous; surface distinctly reticulato-alutaceous, feebly shining. Head and prothorax coarsely not closely punctate. Head a little narrower than the prothorax, the latter quadrate with obtuse angles; sides straight, just perceptibly convergent posteriorly, margin feebly crenulato-denticulate, disk flattened medially. Elytra a little wider than the prothorax, finely striate, the striæ distinctly, rather closely punctate. Pygidium and last ventral segment very coarsely, closely punctate; segments 2-4 each with a single transverse series of coarse, elongate, closely placed punctures; coxal lines of first ventral distinct, nearly or quite attaining the posterior margin of the segment. In the male the last ventral segment is shorter than the three preceding united, the tip truncate. In the female the last segment is fully as long as the preceding, oval at tip. Length 2-2.3 mm.; width .55-.65 mm.

Southern California, Ojai Valley, March, under bark of dead sycamore. A good series of this species taken by the writer has stood in his collection for more than twenty years without a name. As compared with *striolatum* it is a little less robust with differently coloured elytra, more distinctly alutaceous integuments, less irregularly punctured prothorax, and elytral striæ almost completely attaining the apex. In the single example of *striolatum* before me the elytral striæ are more abbreviated, with numerous irregularly placed punctures at apex. As compared with *striatum*, the only other species of this genus that enters California, the present species is a little larger and stouter, with better defined elytral striæ and much more coarsely punctured under surface.

Sphindocis, new genus.

Closely allied to *Orthocis* in its elongate parallel, slightly depressed form, subglabrous surface, posteriorly margined elytral suture, and simple apex of the anterior tibiæ. The maxillary palpi are stout, the last joint widely truncate, instead of pointed as in *Orthocis*, antennæ 11-jointed, the basal joint stout, oval, 2nd similar but smaller; 3rd as long as the 2nd but more slender, about twice as long as wide; 4th to 8th gradually shorter, the 8th

*Trans. Am. Ent. Soc. XII, 1879, p. 265.

slightly transverse; 9th to 11th forming a loose club. Head and clypeus simple in the male, in which sex there is a small setigerous fovea near the base of the first ventral segment.

***Sphindocis denticollis*, n. sp.**

Rufotestaceous, strongly shining, prothorax and elytra coarsely, closely, uniformly punctate; head similarly but not quite so coarsely so. Prothorax one-third wider than long, sides parallel and broadly arcuate, margins narrowly, abruptly reflexed and quadridentulate. Elytra scarcely wider than the prothorax, slightly more than twice as long as wide, sides parallel to apical two-fifths, apex evenly rounded. Beneath coarsely, closely punctate anteriorly, abdomen except the basal segment finely and sparsely so. Length 3.75 mm.; width 1.25 mm.

California (Alameda Co.). A single male. If we exclude the Rhipidandrinae this is the largest *Ciside* known to me. In its size and denticulate thorax it somewhat suggests *Odontosphindus*. The surface, as in *Orthocis*, is not perfectly glabrous, each puncture bearing a very minute hair.

SEASONAL IRREGULARITIES IN THE
OCCURRENCE OF DRAGONFLIES.

BY E. M. WALKER, TORONTO.

The exact composition of the dragonfly fauna of a given locality is subject to frequent change. The effects of erosion on the beds of streams, the deposition of sediment and the accumulation of organic debris in lakes and ponds are constantly producing gradual changes of environment which react on the Odonate fauna, as on other groups of aquatic life, resulting in time in the disappearance of many of the original resident species and the invasion of new forms better adapted to the altered conditions. The drying up of water-courses, due to the clearing of the forests, the pollution of streams and the filling of ponds and swamps are also causing the disappearance of many species from the affected localities, while other species previously unknown in the district find suitable breeding-places in newly created bodies of water, such as result from damming streams, the construction of canals, drainage ditches through swamps and along railways, gravel pits and other excavations, etc.

May, 1917

But apart from the changes due to alterations in their breeding-places, additions to the local list of dragonflies in well-worked localities are of frequent occurrence and are doubtless generally due to the great powers of rapid and sustained flight possessed by these insects, and the tendency of many species to wander far afield from their place of emergence. This wandering tendency in some species amounts to a true migratory instinct, and it has been recently shown in a very interesting article by Howard J. Shannon* that certain species such as *Anax junius*, *Libellula pulchella* and *Tramea lacerata*, together with other insects, notably the Monarch Butterfly (*Anosia plexippus*), follow regular annual migration routes which are closely similar to those of birds. I have never witnessed such a migratory flight, although they have been frequently reported, but it may be of some interest to record some desultory observations I have made, which seem to indicate that some of our Odonata habitually fly distances of many miles during their ordinary foraging excursions, and that the occurrence of large numbers of a particular species in a given locality does not necessarily indicate that they were bred from water in that vicinity. They also illustrate the point already referred to, viz., the frequent occurrence in a particular locality of stray individuals of species not normally resident there.

These observations were made, for the most part, at De Grassi Point, on the west shore of Cooke's Bay, Lake Simcoe, Ont., where I have been collecting and observing dragonflies during a majority of the past 15 years, and they relate chiefly to the species of *Æshna*, to which genus I gave special attention for several years, while accumulating material for my monograph of the group. This genus is, moreover, one that is of particular interest in this connection, as the species are all large insects of powerful and wide ranging flight, and are better represented than any other genus of Odonata in the vicinity of De Grassi Point.

I have described elsewhere** the occurrence at De Grassi Point during certain years, of vast numbers of *Æshna canadensis* E. Walk. and *A. constricta* Say, and have noted that the swarms

* Insect migration as related to those of birds. The Scientific Monthly, vol. 3, No. 3, p. 227, Sept., 1916.

** The N. Am. Dragonflies of the genus *Æshna*, Univ. Toronto Studies, Biol. Ser., No. 11, 1912.

were observed during very warm, still weather. The past two seasons (1915 and 1916) presented a remarkable contrast in weather conditions, and an equally marked contrast in the numbers of dragonflies in flight at the "Point." The season of 1915 was almost continuously cold and wet and dragonflies were so scarce that it was hardly worth while collecting them. The summer of 1916, on the other hand, was unusually hot and dry, particularly during the months of July and August, when *Aeshna* is chiefly on the wing. This season was remarkable for the abundance of several species of dragonflies, notably *Aeshna canadensis*, *A. constricta*, *Leucorrhinia intacta*, *Libellula pulchella* and *Sympetrum obtrusum*.

Almost immediately after my arrival at the Point, on July 12, 1916, I noticed that *A. canadensis* was very plentiful among the scattered trees along the edge of a dense wood and in a somewhat open grove of pine and oak. The hot, dry weather, which was to last nearly all summer had already commenced. On the 19th the dragonflies were so numerous in some places that one could scarcely take a step without flushing one or more from the trunks and branches of the trees. I often saw two or three on a single trunk, and once noted five on one dead branch.

Being curious to know whether the exuviae of this species would be correspondingly abundant, I visited the nearest marsh at the outlet of Wilson's Creek, a sluggish stream about three-quarters of a mile to the northwest, and another at the outlet of Whitefish Creek about a mile and a half to the south. A prolonged search at both places yielded only five exuviae and one full-grown nymph. Not a single adult was seen at either creek. I had always supposed that these two creeks were the principal breeding places of these species, as there are no others within several miles, but my doubts were now aroused. The absence of adults was expected as they always leave their breeding places soon after emergence, but the scarcity of nymphs and exuviae was significant.

On July 24 I left Lake Simcoe, returning on August 5. *A. canadensis* was now quite scarce in the woods, but *A. constricta* was beginning to appear and became daily more plentiful. By about the 15th its numbers had so increased that it was even more abundant than *A. canadensis* had been. Copulating pairs were frequently seen throughout August and in early September, steer-

ing their erratic course in the open or sometimes resting on low branches.

On August 18 I witnessed the largest flight of *Æshna* I have ever seen. They were first noticed about 5 p.m., flying a few feet from the ground over the grassy spaces and roadway just behind the cottages along the lake front. They were hawking after other flying insects such as midges (*Chironomidæ*), which were very abundant, and each dragonfly appeared to restrict its movements to a more or less definite area. In certain spots they were so abundant that there seemed to be about one for every square yard of ground surface. The day was hot but the sun somewhat obscured by the smoke of distant forest fires. The insects flew continuously, never being seen to rest. A number were captured, all proving to be *constricta*, males predominating. As the sun set they rose higher and began to disperse, and at 7.10 p.m., though still numerous, their numbers had greatly diminished and they were flying at about 30 or 40 feet from the ground. At 7.15 p.m. they had almost entirely disappeared.

On the same day earlier in the afternoon I visited Wilson's Creek to ascertain whether the swarms of *A. canadensis*, which had left the woods, had migrated there for breeding purposes, and also whether *A. constricta* or its exuviae were present. I found the former species in considerable numbers but nothing was seen of *constricta*. The numbers of *canadensis*, however, were quite insignificant as compared with those seen about the woods earlier in the season.

From now on *A. canadensis* gradually diminished in numbers, while *constricta* continued to be plentiful throughout August and in early September. A small number were seen at Wilson's Creek on Sept. 3, but they were flying high and apparently none were engaged in oviposition. Their numbers now began to dwindle at De Grassi Point, although there were still a few about the place when I left on Sept. 23. As they evidently did not go to Wilson's Creek to oviposit, or at most in small numbers, I went on Sept. 13 to the wide marshes at the mouth of the Holland River, about $3\frac{1}{2}$ miles from the Point. It was too cool for dragonflies to be flying in large numbers, but I saw a considerable number of *Æshnas* on the wing and found several others resting in the marsh grass.

All I could identify were *constricta*, and I felt satisfied that they would have appeared in much larger numbers had the weather been favorable. The Holland River is the principal source of Lake Simcoe and winds for many miles through wide prairie-like stretches of open marsh. I believe, therefore, that this river is the chief breeding-place for both species of *Æshna* and that the vast majority of individuals which spread over the countryside during their foraging excursions, ultimately return there to oviposit. I received reports of the occurrence of immense numbers of large dragonflies, presumably *Æshnas*, from the neighbourhood of Big Bay Point, almost ten miles north of De Grassi Point, and I am strongly of the opinion that these also came in large measure from the Holland River.

On the basis of this habit of wandering many miles from their breeding-places an explanation may be offered of the prevalence of these species of *Æshna* at De Grassi Pt. and other localities during warm seasons, and their scarcity during cool seasons. Warm weather induces activity in dragonflies and on hot, sunny days *Æshna* is frequently in almost ceaseless flight, while in cool, dull weather it scarcely flies at all. Hence, in warm seasons they spread to localities, more or less remote from their breeding-places, which under other conditions they do not reach at all. It is thus quite probable that the actual number of dragonflies which emerge from their breeding-places is not appreciably affected by the temperature of the surrounding air. It is also possible, however, that their numbers after emergence may be more rapidly decimated by their enemies in cool seasons than in warm, owing to their relative inactivity under these conditions.

The nomadic habits of *Æshna* may also be illustrated by the following instances of occasional or sudden appearances at De Grassi Point of species of this genus, other than *canadensis* and *constricta*.

On Sept. 9, 1916, I spent part of the afternoon at Wilson's Creek, watching the *Æshnas* patrolling the marshy banks of the stream near its mouth. I had supposed they were all *canadensis*, but on capturing one I was surprised to find that it was *A. eremita* Scudd, a common northern species, which I had never taken here before. My next capture was also *eremita*, both being old males

and one of them decidedly worn. The third specimen was *canadensis*, as were apparently the majority, though I took very few others.

On Sept. 19 I noticed *Æshnas* flying about the pastures where *A. constricta* had been so abundant, and at first sight I took them for this species, which was still abroad, though in declining numbers. My suspicions were aroused, however, on seeing them fly to rest upon the trunks and branches of trees, a habit not characteristic of *constricta*, so I captured one and it proved to be *A. verticalis* Say, a species which until then I had not seen that season. Several others of both sexes were taken with only one *constricta* among them, and during the few remaining days I spent at the Point, i. e., until Sept. 23, *verticalis* was the only species noticed about the pastures. All were old individuals, most of the females having broken abdominal appendages. This species is of rather regular occurrence at the Point but always appears late and in fully mature, if not worn, condition, and I have never found the nymph nor seen the adult in the vicinity of the marshes in this locality. I believe, therefore, that it does not breed here to any extent.

On Sept. 10, 1915, at about the same spot where *verticalis* was seen in 1916, I took a male of *A. tuberculifera* E. Walk., a rare species, never known before from this locality, although regional. On July, 1, 1905, a single male of *A. sitchensis* Hagen was captured by Mr. A. L. Walker, and on Sept. 2, 1906, I took a female of *A. subarctica* E. Walk. Both of these are northern species, the normal southern limits of whose range is far north of Lake Simcoe. They have not been seen here since.

Two other species of *Æshna* are known from De Grassi Point, *A. clepsydra* Say, of very rare occurrence, and *A. umbrosa* E. Walk., which is a regular resident of the upper shadier parts of the creeks, and is always common but never appears in swarms.

As regards the general Odonate fauna of De Grassi Point, several points of interest may be noticed here. The ecological conditions are not very varied, and the number of regular resident species is consequently rather small. In all, fifty-three species have been taken, all within an area of about a square mile; but of

this number no less than 13 species were captured on one occasion only. Ten of these are represented by single specimens the other three by two each. Of two others (*vide infra*) nymphs have been found but no adults.

The ten species represented by single specimens included, besides the species of *Æshna* already mentioned, *Epiaeschna heros* Fab., ♂, with a broken wing, found floating on the lake; *Boyeria vinosa* Say, ♀, found ovipositing; *Didymops transversa* Say, ♀; *Erythemis simplicicollis* Selys, ♀; *Libellula luctuosa* Drury, ♂; *Sympetrum scoticum* Donov., young ♂; and *Hagenius brevistylus* Selys., exuvia. A specimen apparently of the last-named species was also seen floating on the lake, from a sailboat. The three other species are:—*Tetragoneuria canis* MacLachlan, 2 ♂s taken within a few minutes of each other at Wilson's Creek; *Cannagrion resolutum* Hag., a pair in copula from the same locality, and *Æshna eremita* Scudd., 2 ♂s as already mentioned. Some of these species evidently breed here occasionally or permanently in small numbers, while others are doubtless strays from other localities.

The two species as yet found only in the larval state are *Chromagrion conditum* and *Cordulegaster* sp., both of which were noticed for the first time in 1916. The nymphs of the former were taken from the upper part of Whitefish Creek on Sept. 10. I have never seen the adults in this vicinity but it is quite possible that I have overlooked it, if restricted to this spot. As to *Cordulegaster*, I have been searching for this elusive creature ever since my interest in dragonflies began, but I have never yet seen a living adult of any of the Eastern species that I can remember, though fragments of a specimen of *C. obliquus* found in a box of remnants, all apparently from De Grassi Pt., testify to my having once taken a specimen of this genus here. Of its capture, however, I have no recollection, and I had long given up hope of ever finding another *Cordulegaster* of any species in this locality. Imagine then my surprise and delight when on Sept. 11, 1916, while pulling up the masses of water-cress from a small brook (the upper part of Wilson's Creek) I brought to light two full-grown nymphs of the coveted genus. I continued the search and succeeded in getting all I could carry home. Some of these are still alive, and I hope to obtain adults from them during the coming season.

That such a large, conspicuous insect as *Cordulegaster* could have escaped my observation all these years, if it has been here continuously, seems at first sight improbable, and yet in this case I am inclined to believe, from the numbers of nymphs present in the creek, that the species is a regular resident. The adults of *Cordulegaster* are short-lived and their season of flight is probably over soon after the usual time of my arrival at Lake Simcoe in late June or early July, and my visits to their haunts, which have not been frequent, have probably all been too late.

In conclusion we may summarize the following points, which are suggested by the foregoing observations.—

1. Certain species of dragonflies are much more abundant in certain localities during warm seasons than during cold seasons.
2. This abundance is probably not due to the emergence of large numbers of individuals from their breeding-places, but to the greater activity of flight in warm weather, whereby the insects are dispersed to localities not visited in cooler seasons.
3. The Odonate fauna of a restricted locality contains a large percentage of transient resident species and stragglers from other localities, such species varying greatly from year to year.

THE NORTH AMERICAN SPECIES OF *HABROCYTUS* (CHALCID-FLIES).

BY A. A. GIRAULT, GLENNDALE, MD.

Generic Characters of Habrocytus.

The scutellum bears a more or less distinct cross-carina (or indicated as such) before apex (except in *medicaginis* and *borrowi*). The spiracular sulcus is present, foveate (exceptions noted). The clypeus is finely striate. The genus differs from *Pteromalus* mainly in mandibular structure but the abdomen is less flat, longer (conical) and the neck of the propodeum not usually conspicuous, but short and variable between the species. The propodeal spiracles are long and elliptical (smaller in *canadensis*). The types of all the species have been seen. The following table is based on the females:

May, 1917

Antennæ inserted somewhat below the middle of the face.
Parapsidal furrows not complete. Mandibles 3- and 4-
dentate.

1. Fore-wings with a large, smoky area under the whole of the marginal vein. Propodeum with a large neck, tricarinate. Abdomen produced beneath, with a very short petiole. Pedicel shorter than funicle 1, the latter twice longer than wide. Coxæ and femora concolorous, the middle tibia infuscated, the caudal so at base. Scutellum without a cross-suture before apex (or an indicated one). Clypeus sinuate.....*borrowi*, n. sp.

2. Fore wings hyaline.

Ovipositor not extruded. Coxæ above metallic, the legs lemon yellow, the antennæ yellow-brown. Clypeus sinuate rather deeply at apex. Antennæ inserted but a little above the ventral ends of the eyes. Spiracles at the base of a broad hollow, bounded by the lateral carina and a carina laterad of the spiracle, no sulcus. Propodeum tricarinate. Pedicel and funicle 1
subequal.....*onerati* (Fitch).

Coxæ concolorous, the femora brown or washed with metallic or metallic. Scape yellow.

Clypeus distinctly concave or sinuate at distal margin.

Propodeum tricarinate and with a very short neck (irregular rugæ between the carinæ). Funicle 1 somewhat over twice longer than wide, twice the length of the pedicel, 6 a half longer than wide. Tibiæ white. Marginal vein nearly twice the length of the stigmal. Femora usually washed. Funicle and club

black.....*rhodobæini* Ashmead (= *languriæ* Ashmead).

The same but the femora usually deep metallic, the tibiæ golden yellow, the funicle joints somewhat shorter, the flagellum brown *phycidis* Ashmead (= *piercei* Crawford).

The same as *phycidis* but the tibiæ brown, white at tip, no median carina on propodeum, the foveæ of spiracular sulcus minute.....*cerealellæ* (Ashmead)

The same, but the femora and tibiae reddish brown, the tips of the last two pairs of tibiae broadly white. Funicle joints as in *phycidis*. Propodeum with a distinct neck. Abdomen more like that of

Pteromalus.....*rhodobæini rosæ*, new var.

Clypeus sharply incised at meson so as to appear bidentate there. Femora metallic. Flagellum black. Propodeum without a neck, scaly, impunctate, tricarinate. Scutellum without a faint cross-carina. Stigmal vein subequal to the marginal.

Funicle 1 a little longer than pedicel, somewhat longer than wide, 6 a little wider than long. Small species.....*medicaginis* Gahan.

Clypeus truncate or subtruncate. Femora barely metallic. Tips of tibiae white, the femora and tibiae brown yellow; striae of clypeus faint; antennae yellow, funicle 1 barely longer than the pedicel, longer than wide, 6 wider than long; stigmal vein somewhat shorter than marginal. Otherwise as in *rhodobæini*, but small.....*aulacis*, n. sp.

The same, but a half larger, the tibiae and tarsi lemon-yellow, the flagellum black, the club yellowish, the spiracular sulcus absent, the median carina irregular. Clypeal striae distinct.....*arkansensis* n. sp.

Coxae and femora concolorous, scape concolorous.

Clypeus rather deeply concaved or sinuate. Propodeum tricarinate, the neck short. Pedicel and funicle 1 subequal. Caudal tibia reddish brown, pale yellow at tip. Spiracular sulcus short, complete, bifoveate. Spiracle curved.....*franciscanus* n. sp.

Ovipositor extruded for a fourth or more the length of the abdomen.

Clypeus sinuate at distal margin, striate.

Coxae and femora concolorous, the scape yellowish brown. Ovipositor extruded for a fourth the length of the abdomen.

Propodeum with a distinct neck, tricarinate. Funicle 1 twice longer than wide, much longer than the pedicel. Usual otherwise.....*dux* n. sp.

Coxæ alone concolorous, the legs white. Scape concolorous except at base. Ovipositor three-fourths the length of the abdomen.

The same as *dux* but slender (as in *Belonura singularis* Ashm.), no spiracular sulci, the spiracle oval, small, the lateral carina absent, no neck. Head subquadrate. Funicle 1 thrice longer than wide.....*canadensis* n. sp.

Habrocytus rhodobæini rosæ Girault.

Two pairs, Brooklyn, N. Y., February 9, 1913, from rose (A. S. Berquist). The *Habrocytus rosæ* Ashmead, in Annals Ent. Soc. of America, VIII, 1915, p. 278.

Types.—Catalogue No. 20414, U. S. National Museum, one male, two females on two tags.

Habrocytus medicaginis Gahan.

Several females reared in connection with *Bruchophagus funebris* from red clover seeds, St. Paul, Minnesota (W. Williamson).

Habrocytus aulacis Girault.

Two females, Wooster, Ohio, reared in connection with an *Aulax* gall.

Types.—Catalogue No. 20418, U. S. National Museum, two females on tags, a head and a caudal leg on a slide.

Habrocytus quinquecarinatus Girault.

This species has no spiracular sulcus. It differs from the other species in being varicoloured.

Habrocytus franciscanus Girault.

Three females, San Francisco County, California, July.

Types.—Catalogue No. 20416, U. S. National Museum, the females on tags, a head, the caudal legs and a fore wing on a slide.

Habrocytus borrowi Girault.

One female in the U. S. National Museum from Colorado. Dedicated to George Borrow.

Type.—Catalogue No. 20417, U. S. National Museum, the specimen on a tag, the head, caudal legs and a fore wing on a slide.

Habrocytus arkansensis Girault.

Males, females reared in connection with *Isosoma*, Garfield, Arkansas (T. S. Wilson).

The males have the antennæ entirely yellow, the legs (except the coxæ), golden yellow.

Types.—Catalogue No. 20419, U. S. National Museum, three females on tags, a head and caudal legs on a slide.

Habrocytus dux Girault.

One female, Canobie Lake, New Hampshire.

Type.—Catalogue No. 20441, U. S. National Museum, the female on a tag, the head and a caudal leg on a slide.

Habrocytus canadensis Girault.

Toronto, Canada (Wm. Brodie).

Type.—Catalogue No. 21071, U. S. National Museum, a tag and a slide.

Habrocytus cerealellæ (Ashmead).

Parasite of *Sitotroga cerealella*, Philadelphia, Pennsylvania.

Types.—Catalogue No. 6115, U. S. National Museum, tags and a slide.

Catolaccus anthonomi Ashmead has 3- and 4-dentate mandibles but I am not sure how many ring-joints, apparently three (but female type has lost antennæ).

The species *obscuripes* has an obscure cross-carina on the scutellum near apex, despite what I have said in the Annals of the Entomological Society of America, IX, 1916, p. 292. It does not belong here (tridentate mandibles).

THREE NEW SPECIES OF JASSOIDEA FROM MISSOURI.

BY EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY.

With the addition of the following new species the total number of Jassoidea reported as occurring in Missouri* is brought to 155.

Tinobregmus moodii n.sp. Near *pallidus* Osb. but slightly larger, with loræ exceeding the middle of the clypeus and elytra not extending to pygofer.

Vertex narrow, broadening anteriorly; front narrow, elongate; clypeus elongate, at its widest point equaling width of front, only slightly emarginate at apex; beak extending to hind coxæ; cheeks long, flaring; loræ narrow, elongate, exceeding the middle of the clypeus. Pronotum short, length less than half that of width, posterior border slightly sinuate. Elytra ovate, not extending to the pygofer; veins rather indistinct. Length of female $6\frac{1}{2}$ mm. to tip of ovipositor; male $4\frac{3}{4}$ mm. long.

Colour, pale tawny yellow, vertex and pronotum of female unmarked, tip of vertex of male irregularly marked with fuscous; front and clypeus marked with a broad, longitudinal vitta on each side which coalesce just before apex of clypeus. Pronotum bordered laterally with fuscous; elytra subhyaline to opaque with a heavy, black border at the apex. Dorsal side of abdomen irregularly marked; pectoral pieces black; venter fuscous with whitish border; ovipositor black.

Genitalia, last ventral segment of female distinctly sinuous, ovipositor extending beyond the pygofer; male plates long and narrow with acute apex.

Described from one female and one male which are deposited in the collection of the U. S. National Museum. Specimens were taken in a sweeping from weeds growing on a high ridge of the Ozark Mt. range, near Branson, Mo., August 22, 1916, by Mr. F. M. Moody in whose honor the species is named.

*Note—Species of Jassoidea occurring in Missouri have been recorded as follows:

Gibson, E. H. and Cogan E. S. A preliminary list of Jassoidea of Missouri with notes on species. Ohio Jr. Sci., Vol. 16, No. 2, December, 1915.

Horsfall, J. H. Additions to the list of Missouri Jassoidea. Ohio Jr. Sci., Vol. 16, No. 8, June, 1916.

Gibson, E. H. Additions to the list of Missouri Jassoidea. Canadian Entomologist, Vol. 49, No. 2, February, 1917.

May, 1917

Euscelis ozarcensis n. sp. Resembles *arctostaphyli* Ball but can be distinguished by greater length of last abdominal segment of female, the lateral angles of which are more produced, also by having a much more simple colour pattern on vertex.

Vertex obtusely angulate, apex produced, length two-thirds that of width and about two-thirds length of pronotum. Front broad and only slightly convex. Clypeus parallel-margined, hardly twice as long as broad. Elytra short and broad, apical cells small, central anteapical cell only slightly constricted on inner side. Length 3 mm.

Colour, decided brown, with anterior margin of vertex and costal margin of elytra bright yellow. A transverse dark brown or black band between anterior portion of eyes. Posterior margin of vertex bordered with cream. Pronotum and elytra of same intensity of colour. Scutellum light brown. Elytra nervures prominent, very light brown to cream. Face marked with dark cross-bars. Cheeks irregularly marked. Below dark; tibia pale, pygofers blotched.

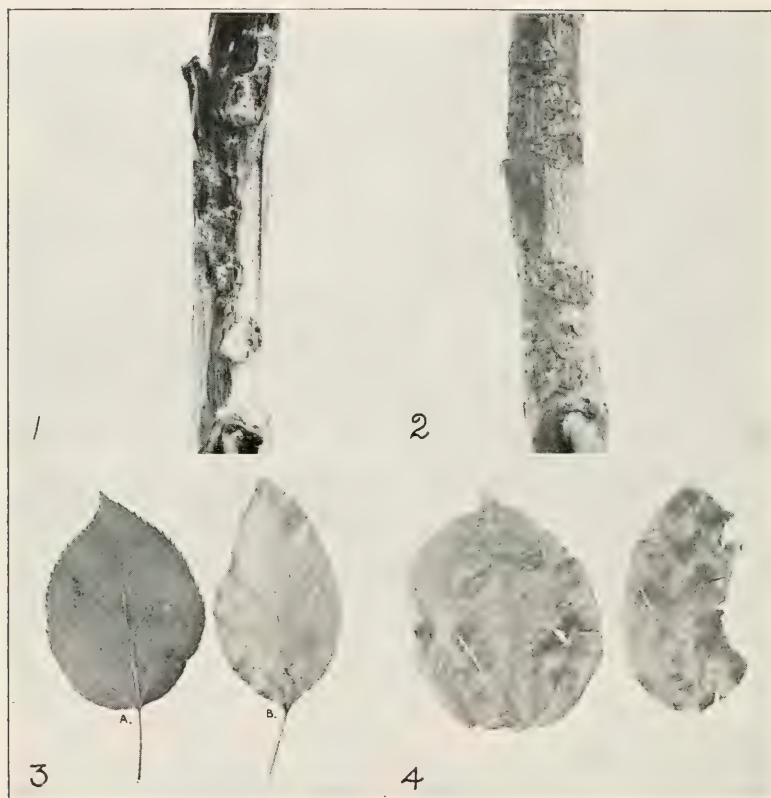
Genitalia, last ventral segment of female twice longer than penultimate, lateral angles produced; two slight notches, one on either side of ovipositor. Male plates triangular and twice the length of valve.

Described from two females and two males collected by the author in the Ozark Mts. near Branson, Mo., August 21, 1916, and now deposited in the collection of the U. S. National Museum.

Typhlocyba modesta, n. sp. Near *rosæ* Linn., but differing in female posterior segment being distinctly notched, and in larger size. Face considerably longer than broad, clypeus less than one-fourth the entire length of face, superior angle of face obtuse. Length of pronotum hardly twice that of vertex. Scutellum large. Last ventral segment of female produced and rather deeply notched.

Colour, light yellow to cream, vertex slightly tinged with deeper yellow. Thorax, scutellum and abdomen concolorous. Elytra hyaline with apex tinged with yellow. Eyes brown; tip of ovipositor and tarsal claws dark brown to black. Length $3\frac{3}{4}$ mm.

Described from two females and one male collected by the author at Charleston, Mo., during May and June, 1916, and which are now deposited in the collection of the U. S. National Museum.



WORK OF APPLE LEAF MITES (P. 189).

The Canadian Entomologist.

VOL. XLIX. LONDON, JUNE, 1917

No. 6

POPULAR AND PRACTICAL ENTOMOLOGY.

TWO APPLE LEAF MITES OF ECONOMIC IMPORTANCE.

BY W. H. BRITAIN, PROVINCIAL ENTOMOLOGIST FOR NOVA SCOTIA.

THE "SILVER-LEAF" OR "RUSTY-LEAF" MITE.

(*Phyllocoptes schlectendali* NALEPA.)

During the summers of 1912 and 1913, which the writer spent in British Columbia, he had an excellent opportunity for observing the work of the mite *Phyllocoptes schlectendali* Nalepa, this species being extraordinarily abundant in the Okanagan Valley and other parts of the Dry Belt.

It is most commonly found attacking the leaves of the apple, and though it cannot often be considered a serious enemy of the foliage, the result of its work is conspicuous and peculiar. The presence of the mite makes itself apparent by a decided silvery appearance of the leaves, which, in severe cases, is very pronounced and can be detected from a considerable distance. This appearance is due to the formation of an air space between the epiderm and the palisade cells due to the punctures of the mites. A tree so affected bears a striking resemblance to one attacked by the disease Silver-Leaf, said to be caused by a fungus (*Stereum purpureum* Pers.)

This is not the only case in which a silvery appearance is brought about by the work of mites. On plums, bad infestations of Red Spider (*Tetranychus bimaculatus*) produce a somewhat similar appearance, though not so characteristic, and mites feeding upon elm leaves have been observed to produce similar symptoms. It was first thought that all such trees were suffering from Silver-Leaf, which is not surprising, since both these troubles are very abundant in British Columbia and are often present on the same tree. It was only, however, when trees that had been sprayed with nicotine sulphate did not develop the disease that this diag-

nosis was thrown in doubt and the true cause discovered. Though this type of injury is very common in British Columbia and appears to have been noticed quite widely in the United States and Canada, the amount of actual harm which the mites accomplish in this way is questionable, and is probably of little importance in most cases. Parrott (1 and 2) who appears to have been the first to have recorded this species in America, says that this species is very common on apple foliage in the United States, that it is more common in the United States than on the continent, and that it seems to have possibilities of developing to greater economic importance. P. J. O'Gara (3) who records this mite from Southern Oregon, noticed its work on the apple foliage, which, however, he did not regard as serious. He states that the mite is chiefly important as a pest of pears, the foliage, terminals of twigs and even the fruit being injuriously affected. He describes the injured foliage as presenting a peculiar russet appearance on the underside, and as being somewhat curled, as though with drought. The terminal shoots and the fruit is also attacked, being russetted and cracked as a result of the punctures of the mite. With serious attacks, the whole tree is said to have a brownish appearance, giving the trouble the name "Rusty Leaf," by which it is known in the Rogue River Valley, Oregon. We have never noticed such severe attacks to the pear in British Columbia, but it would not be surprising to find that such existed, so prevalent is the mite throughout the fruit-growing sections. It would appear from the foregoing that, though this pest is known to be prevalent throughout the United States and Canada, it has never been regarded as a serious enemy of apple foliage, and only locally as a serious pest of pears.

Through the summer of 1912 numerous specimens of apple twigs were sent to the office of the Provincial Entomologist at Vernon, disfigured in a curious way by brownish incrustations on the bark of one and two-year-old wood. These injured areas were generally more or less circular in form, though sometimes of an irregular shape. A crack usually separated the healthy from the diseased wood, and the epidermis was frequently ruptured. This injury appeared to be most pronounced on wood of the Northern Spy, though other varieties suffered to some extent. A careful

examination of the incrustations revealed nothing of a parasitic nature.

The next year similar injured twigs were submitted for examination in even greater quantity. In particular, a number of nursery firms complained of heavy loss to their Northern Spy stock from being rendered so unsightly as to be quite unmarketable. One firm, situated in the Okanagan, was compelled to destroy a large quantity of Northern Spy stock, as a result of this trouble. It appeared, on further examination of affected twigs, that the year following the appearance of the trouble, the injured areas frequently dropped out, thus rendering the injured tree more unsightly than before. Further examination of the incrustations still revealed nothing, but so serious had the situation become, that it was decided to follow the matter up carefully, in order to determine definitely the cause of the trouble.

The writer left British Columbia in the fall of that year and was unable to prosecute this matter further. However, Mr. J. S. Dash (5), then working under the direction of the Inspector of Fruit Pests, examined a number of injured twigs during the month of October. He found them to contain hundreds of hibernating mites, whose identity could not be ascertained with certainty at the time, since they were immature. At the request of the writer, a number of affected nursery trees were sent to Truro, kept over winter and planted out the following spring. In July the silvery appearance, characteristic of the work of *Phyllocoptes schlectendali*, became apparent on the leaves, which, on examination, were found to be covered with mites belonging to this species.

It would appear from our observations that the mites, which feed on the foliage during the summer months, make their way to the twigs in the autumn where they enter an old egg blister of the Rose Leaf-hopper (*Empoa rosæ*), a common apple pest throughout the province, or of the Apple Leaf-hopper (*Empoasca mali*) or through a lenticel, and there they develop their hibernating incrustations, which render the affected trees so unsightly. As an enemy of nursery trees and particularly of Northern Spys, this mite is, therefore, of considerable importance, since stock so disfigured is unmarketable. The actual harm done to such

stock is slight and, as a pest of older trees, it cannot be considered as being of a very serious nature.

THE APPLE LEAF MITE (*Eriophyes malifoliæ*).

Regarding this mite Parrott (2) says: "This is a vagabond species and is found in association with *Eriophyes pyri* and *Phyllocoptes schlectendali*, upon the under surface of apple leaves." From this it is apparent that he regards this mite as of secondary and minor importance and not able, by itself, to inflict much injury. While we have never seen any particularly destructive outbreaks, it is possible that this mite may prove to be of greater economic importance than is commonly supposed, at least under conditions that exist in the Okanagan.

In view of the resemblance between the injuries produced by the former species discussed and a fungous disease, it is an interesting fact, that this mite causes symptoms strikingly like another fungous trouble, viz., Apple Scab (*Venturia pomi*). The mites work on the underside of the leaves, concealed by the pubescence, and the first indication of their work is in the form of more or less olive-green, circular spots on the upper surface, which gradually darken until they become dark brown in colour. These spots become slightly raised above the surface of the leaf, forming a saucer-shaped hollow on the underside. These symptoms are so suggestive of apple scab, that it is not surprising that they have been mistaken for this trouble even by those familiar with the disease. Not only were the leaves affected but the tender shoots were also attacked, causing them to wither and become brown and dead. This appearance is suggestive of the damage done to pears by *Phyllocoptes schlectendali*, as described by O'Gara, but was noticed where only *Eriophyes malifoliæ* was present. This type of injury was very prevalent during the summer of 1913.

Unfortunately we were prevented from making observations regarding the hibernating habits of this species, but we feel certain that a careful study of its life history and habits would reward research. It is altogether possible that these two species discussed in this article are responsible for much more damage than is com-

monly attributed to them. In particular it seems well within the range of possibility that they may be responsible for many of the blotched apples and the disfiguration of other species of orchard fruits that is so common throughout the fruit districts, since both species have been found feeding in large numbers on fruit so affected. Which of the species discussed here, if either, is responsible for such injury, can only be determined by experiment.

The problem of control should be a comparatively simple one, since both species are readily destroyed by the summer sprays of lime-sulphur, or by weak solutions of nicotine sulphate.

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EXPLANATION OF PLATE X.

- Fig. 1. Injury to apple twig by hibernating incrustations of *Phylloctes schlectendali*.
- Fig. II. Appearance of injury the next season.
- Fig. III. A, Leaf infested with *Phylloctes*; B, Uninjured leaf.
- Fig. IV. Leaves injured by *Eriophyes malifoliae* (Parrott).

THE OCCURRENCE OF EUMERUS STRIGATUS FLN. IN CANADA.

BY ARTHUR GIBSON, ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

In the Entomological Record for 1915¹ a record of this species is included, namely: "Victoria, B. C., reared from narcissus bulbs, April 7—9, 1910, (E. A. Wallace)." In the Record for 1916², the occurrence of the species at Ottawa, Ont. (August, 19, 1904, Fletcher) is mentioned. Recently we received a specimen of *Eumerus strigatus* from Montreal, Que., which was collected in a greenhouse, on Feb. 5, 1917, by Mr. J. I. Beaulne. In October, 1910, Dr. Hewitt, found the larvæ abundant in the greenhouse of Mr. E. A. Wallace, Victoria, B. C.

This European insect which has been recorded as a pest of onions, shallot, roots of Iris and bulbs of narcissus, hyacinth and Amaryllis, has been referred to in economic literature as the Bulb Moon-fly, the Lunate Onion Fly and the Small Narcissus Bulb Fly. Felt³ first recorded the species from America from specimens reared in New York State from the roots of Iris, and referred to the fact that Dr. F. H. Chittenden had informed him that the fly was reared in the Bureau of Entomology at Washington, in 1906. The taking of a specimen at Ottawa in 1904, however, by the late Dr. Fletcher, is evidently the first record of the occurrence of the species in America.

Emerus strigatus is now widely distributed in North America, having been found in the United States in the States of California, Texas, Connecticut and New York, and in Canada in the provinces of Quebec, Ontario and British Columbia.

Theobald⁴ has found as many as 17 larvæ of the species in one bulb and states that "there is no doubt that these small narcissus and other bulb flies are the cause of much loss, but are not, it seems, so widely spread as *Merodon*; still the number one finds

¹46th Annual Report of the Entomological Society of Ontario.

²47th Annual Report of the Entomological Society of Ontario.

³New York State Museum, 27th Report of the State Entomologist, 1911.

⁴Report on Economic Zoology for year ending Sept. 30, 1911.

in samples of bulbs purchased shows that it has to be dealt with just as much as the larger maggot."

MacDougall⁵ describes the larva of *Eumerus strigatus* as measuring "half an inch and over when full grown. It is greyish yellow in colour and has a distinctly wrinkled appearance. The mouth hooks are brown and the respiratory processes at the front end are brownish-red. The rounded hind end is brown at the tip and has a projection on each side with a process which ends in the breathing pores between the projections."

TWO NEW SAWFLIES (HYMEN.).

BY E. P. FELT, ALBANY, N. Y.

The peculiar Xylids with the remarkably developed third antennal segment, are comparatively rare and unusually interesting. It, therefore, seems desirable to publish the description of a recently discovered species in this group, and also one of a related Pamphilid.

Pleroneura borealis, n. sp. The sawflies described herein were collected at Lake Clear, N. Y., June 7, 1907, and in the key given by Rohwer, would run to *P. fulvicornis* Roh., a larger Californian species exhibiting some differences in colour from this species.

Male.—Length 4 mm. Anterior margin of clypeus broadly rounded; narrow, deep furrows extend from the base of the antennæ and unite above the median ocellus, median foveæ, forked ventrally, extending to the base of the ocellus; terminal anterior segment shorter than the preceding. Head and thorax opaque with close, fine punctures; maxillary palpæ large, probably 7-jointed, the second segment distinctly shorter than the anterior femora, the first joint about one-half as long as the second. Claws with a minute tooth basally. Hypopygium roundly truncate, first recurrent vein free from the first transverse cubital. Head black. Thorax brownish black. Abdomen reddish brown. The antennæ, clypeus, labrum, tegulæ, the dorsum of the abdomen

⁵Journal of the Board of Agriculture, London, October, 1913. June, 1917.

apically, the distal half of the venter of the abdomen and femora rufous; tibiae and tarsi mostly yellowish; tibiae and the distal tarsal segments apically reddish brown.

Female.—Length 5.5 mm., to tip of ovipositor 7 mm. Similar to the male and black, except as follows: Antennae dark brown, the third segment almost blackish; clypeus, labrum, mandibles, tegulae, the apex of the abdomen dorsally, the posterior margins of the basal segments and the distal third of the abdomen ventrally (except the black ovipositor), femora and tibiae yellowish or ferruginous; the tarsi reddish brown, the posterior darker.

Described from two males and one female.

***Acantholyda ferruginea*, n. sp.** The sawfly described below differs so greatly from any accessible descriptions, that we have been unable to refer it to known species. It was taken on the summit of Mount Marcy in the Adirondacks, July 31, 1913.

Male.—Length 7 mm. Head brownish black, coarsely and irregularly punctured and with anterior and posterior yellowish, ovate, orbital spots; mandibles fulvous. Antennal segments 21, the first black, with irregular, narrow, yellow annulations basally and apically, the second yellowish brown or dark brown, yellowish apically; third segment shorter than the fourth and fifth combined, the others successively shorter; the third to ninth yellowish brown, the distal segments mostly dark reddish brown. Thorax and abdomen brownish black, the segments of the latter narrowly margined with yellow, the markings on the three posterior segments angulate. Wings suffused with ferruginous, only two submarginal cells, the second cross-vein wanting; venter, coxae and femora brownish black the tibiae and tarsi dark fulvous.

ERRATUM—PLATE IX.

We regret that the lettering for Plate IX, in our May issue, illustrating Messrs. Brittain and Saunders' article, "Notes on the Black Apple Leaf-hopper," was omitted. The figures are arranged from top to bottom of page: Figs. 1-4 on left, Figs. 5-7 on right. The magnifications are as follows; Fig. 1 (x 43), Figs. 2-4 (x 29), Fig. 5 (x 23), Fig. 6 (x 19), Fig. 7 (x 17.5).

TWO NEW APHID GENERA AND SOME NEW SPECIES.

BY C. P. GILLETTE, FORT COLLINS, COL.

In Canadian Entomologist, vol. XL, 1908, p. 67; and in Entomological News, vol. XX, 1909, p. 119. the writer described and figured a peculiar aphid from *Carex* under the specific name of *ballii* and placed it in the genus *Brachycolus*, with a remark to the effect that it did not seem to belong to any known genus.

The appearance of Mr. A. C. Baker's paper, "Synopsis of the Genus *Saltusaphis*," in the January (1917) number of the Canadian Entomologist, leads me to publish the characterization of a new genus—*Thripsaphis*—with *ballii* Gill. as the type, as this aphid seems to me generically distinct from *Saltusaphis* Theobald. In giving his characterization of this genus, Theobald says:

*"Head very large. . . . Cornicles small, cup-shaped. . . .
†Cauda in both forms bifid. . . . Body hairs fan-shaped or sickle-shaped," and attention is specially called to the single cross-vein in the hind wing and the jumping habit of the type species, *scirpus*. None of these characters apply to *ballii* except the venation of the hind wing, and that does not hold for other very closely allied species.

***Thripsaphis*, n. gen.**

General form very long and slender; eyes without ocular tubercles; antennæ 6-jointed; anterior wings normal in venation, but the first cross-vein in the hind wing weak, or absent in some cases, and easily overlooked when present, if mounted in balsam; cornicles represented by pores only; cauda strongly knobbed; precaudal tergite entire; anal plate strongly bi-lobed; gonapophyses .2; body hairs few and not blunt ended or in form of flabellæ; vertex prominent, and the oviparous females, so far as known, have wax glands on the lateral ventral surfaces of the abdomen, just caudad of the cornicle pores, from which are secreted wax

*African Aphididae—Part II, in Bulletin of Entomological Research, Vol. VI, pt. II, p. 138, 1915.

†I have examples of *Saltusaphis scirpus* from Theobald. It is evident that he mistook the extended and strongly bi-lobed precaudal tergite for a bi-lobed cauda. The cauda has a large and typical knob with a narrowly constricted neck which was mistaken by Theobald for the anal plate. The anal plate is bi-lobed also, as in the Colorado species, *flabellus* Gill.
June, 1917.

threads that are used by them with which to cover their eggs. Males, so far as known, apterous and very small.

When the alate form of *ballii* was described, the writer had but a single example in balsam, which did not show the first cross-vein of the hind wing and it was so described and figured, and is probably one of the reasons why Mr. Baker includes this species in *Saltusaphis*. Many alate examples of closely allied species have since been taken which plainly show the first cross-vein, even after being put in balsam, so I do not think the presence or absence of this vein should be given generic importance in the group to which *ballii* belongs.

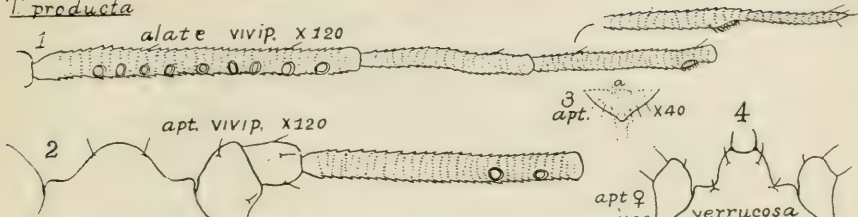
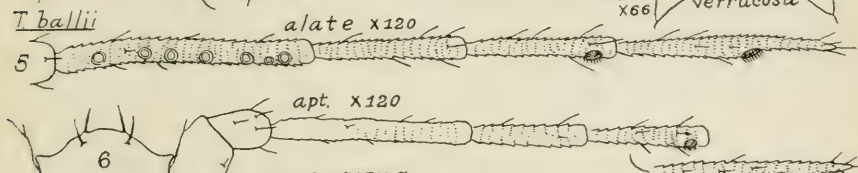
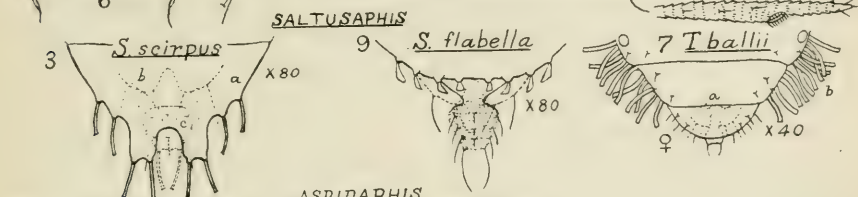
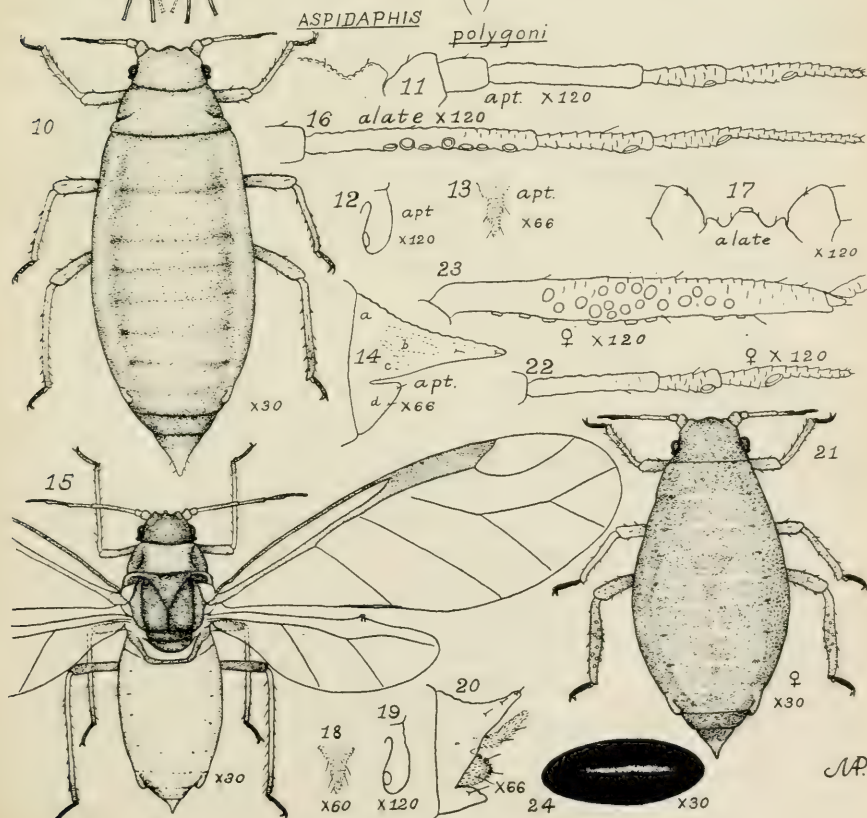
While *Callipterus flabellus* Sanb. does not have the bifid pre-caudal tergite that is so strong a character in the type of the genus *Saltusaphis*, I believe Mr. Baker is right in placing it with that genus, for it qualifies in all other important respects and does have a large eighth tergite bearing tuberculate hairs as in *scirpus* Theobald.

***Thripsaphis ballii* Gill.**

This species is separated rather easily separated from, at least, three other Colorado forms that are congeneric with it, by the short antenna, which, in the alate form, has about 7 small circular sensoria on the third joint, and in the apterous form none, the absence of the first transverse vein in the hind wing of the alate louse, the moderately produced vertex, the short and broadly rounded eighth tergite and the stout femora of the apterous viviparous form. See Plate XI, figures 5, 6, 7.

***Thripsaphis verrucosa*, n. sp.**

In the original description of *ballii* the writer mistook for it the egg-layer of what now proves to be a distinct but closely allied form. See Canadian Entomologist, vol. XL, p. 67 (apterous viviparous female), and plate III, figures 12 and 14. This form must be segregated from *ballii*, and for it I suggest the specific name *verrucosa*, because of the prominent projection on the vertex. See also Plate XI, figure 4, accompanying this paper. The other forms for the year have not been thoroughly worked out, so are held for later descriptions.

THRIPSAPHIST. productaT. balliiSALTUSAPHISASPIDAPHIS

***Thripsaphis producta*, n. sp.**

Our collections indicate this as the most abundant species in Colorado occurring upon *Carex*. With the generic characters given above, only a brief characterization of this species seems necessary.

Alate Viviparous Female.—General colour blackish, legs and antennæ black; length 2.00; wing 2.50 x .70; hind tibia, .60; antenna, 1.15; segments of antenna in following proportions: III, 15; IV, 9; V, 8; VI, 7; spur, 4; sensoria on joint III, 9 to 11, rather large and slightly transverse; venation of fore wing normal and veins rather heavy; hind wing with first cross-vein weak or lacking, usually quite plainly seen before clearing in balsam. See figures 1, 2, 3.

Apterous Viviparous Female.—Colour (in balsam) dark yellowish brown, darkest on lateral margins and back of cornicles; legs black; antennæ black to near base; vertex convex, being rather strongly produced at the middle; length of body 2.10; width .70; antenna .95; third segment with 2-3 small circular sensoria near distal end; segments III, .30; IV, .18; V, .15; VI, 13; spur .08; hind tibia .48; beak very short, but little surpassing the first pair of coxæ; femora not specially thickened for jumping; hairs few, short, and simple; anal plate bi-lobed; 8th tergite produced and rather sharply rounded posteriorly. Figures 2, 3.

***Aspidaphis*, n. gen.**

Wing venation normal; antennæ 5-jointed, less than one-half as long as the body; antenna and body very free from hairs, no lateral tubercles on prothorax or abdomen; cornicles weak, recumbent, shorter than hind tarsus, without flange, somewhat clavate, and with opening lateral, on the inner side, near the distal end; eighth tergite of abdomen developed into a very large triangular shield, which, in the type species, extends well beyond the end of the cauda. Eyes not tuberculate.

The three specially diagnostic characters are: Antenna, 5-jointed; cornicles without flange and with side opening, and the large precaudal shield. See figures 10 to 23.

***Aspidaphis polygoni*, n. sp.**

This aphid, combining some rather unusual structures, was

first taken by Mr. L. C. Bragg upon knot-grass or door-weed, *Polygonum* sp., at Ft. Collins, Colo., in July, 1907, and we have had it under observation each year since and throughout the growing season.

Apparently, the different species of *Polygonum* are the sole food plants of this species. It imitates the colour of the under-side of the leaves and the stems of the plants upon which it feeds so perfectly that it is seen with some difficulty, and it is sporadic in its habits. The lice also have the habit of working beneath the bracts at the bases of the leaves where they are out of sight. The different stages may be described as follows:

Apterous Viviparous Female.—Colour green, with tips of the antennæ, the tarsi, distal ends of tibiæ, and extreme tip of cornicles, dusky to blackish; form of body long and tapering posteriorly to the point of the pre-caudal shield; body, legs and antennæ very free from hairs; antennæ upon slight tubercles, 5-jointed; joints 4 and 5 and spur sub-equal; joint 3 as long as 4 and 5 together, total length about .40; legs short and stout; cornicles a little more than one-half as long as the hind tarsi, placed at extreme lateral margins of abdomen, weak, recumbent upon the abdomen, clavate, rounded and without flange at the distal end, the opening being on the inner side near the end; cauda long, slender and entirely hidden from above by a triangular shield-like projection of the pre-caudal tergite which extends beyond the end of the cauda; lateral margins of prothorax and abdomen without spines. See plate XI, figures 10 to 14.

Winged Viviparous Female.—General colour, pale yellowish or greenish yellow, eyes blackish, head, mesothorax above and below, metathorax above, antennæ and tarsi dusky brown; wing veins heavy and dusky brown to blackish; length 1.40; antenna .40 to .50; wing 1.80; head rather broad and flat, the antenna being widely separated and not upon distinct tubercles, 5-jointed; medium ocellus prominent on the vertex; joints of the antenna: III, .18; IV, .08, V, .07; spur, .08. Joint 3 has about 6 to 8 sensoria; joint IV, 1 near the distal end; joint VI, 1 large and 4 or 5 small ones; antennal segments free from hairs; prothorax rather large and without lateral tubercles; cornicles, concolorous with the abdomen, situated on extreme margins, weak and lying against

the side of the abdomen and about one-half as long as the hind tarsus; terminal segment of the abdomen, above, in the form of a long, triangular plate with an acute upturned apex, beneath which is the cauda, which is rather narrow and directed downward; beak not attaining the second pair of coxæ. See figures 15 to 20.

Oviparous. Female.—The oviparous female differs from the viviparous form in being more robust, a little shorter and brownish or slightly rusty in colour. The antennal joints and other characters are substantially as in the viviparous form. The hind tibiæ are moderately swollen and have 20 or more circular sensoria on their middle one-half. Figures 21–23.

The eggs are bright green in colour when deposited upon the stems of the host plant, but soon turn shining black on exposure. See figure 24.

While we have never found this louse abundant, we have seldom had trouble to find examples when looked for at any time during the growing season.

EXPLANATION OF PLATE XI.

Thripsaphis producta. 1, antenna of alate viviparous female; 2, vertex and first three joints of antenna of same; 3, eighth tergite of abdomen with cauda and anal plate beneath showing gonapophyses (a).

T. verrucosa. 4, vertex showing tubercle.

T. ballii. 5, antenna of alate female; 6, vertex and antenna of apterous female; 7, terminal segments of oviparous female showing gonapophyses (a), and wax threads (b).

Saltusaphis scirpus. 8, showing terminal segments of abdomen of apterous female—(a) large bi-lobed 8th tergite, (b) bi-lobed anal plate, (c) knobbed cauda.

S. flabella. 9, eighth tergite, bi-lobed anal plate (dotted), and cauda of apterous viviparous female.

Aspidaphis polygoni. 10, apterous viviparous female (stem mother?); 11, vertex and antenna of same; 12, cornicle of same; 13, cauda of same; 14, lateral view of 8th and 9th segments, (a) 8th tergite, (b) cauda, (c) anal plate, (d) genital plate of No. 10; 15, alate viviparous female; 16, antenna of same; 17, vertex of

same; 18, cauda of same; 19, cornicle of same; 20, lateral view of 8th and 9th segments of same; 21, oviparous female; 22, antenna; 23, hind tibia and, 24, egg of No. 21. The enlargement is indicated with each figure. Original, Miriam A. Palmer, Illustrator.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA) PART III.

BY CHARLES P. ALEXANDER, CORNELL UNIVERSITY, ITHACA, N. Y.

This paper is a continuation of the preceding articles under the same title (Can. Ent., vol. 48, p. 42-53, 1916; vol. 49, p. 22-31, 1917). The species here considered include a small number of subapterous forms, these belonging to the genera *Chionea*, *Limnophila*, and *Tricyphona*.

I am indebted to Mr. W. L. McAtee, Mr. R. C. Shannon, Mr. C. W. Johnson and other gentlemen mentioned in the paper. I am especially indebted to Mr. L. O. Jackson for specimens herein described. Unless stated otherwise, the types are in the collection of the author.

Subfamily *Limnobiinæ*.

Tribe *Limnobiini*.

Genus *Limnobia* Meigen.

***Limnobia indigena jacksoni*, subsp. n.**

Male.—Length 7.4 mm.; wing 8.8 mm.

Female.—Length 7.1 mm.; wing 7.6-8 mm.

Similar to typical *indigena* O. S. (Northeastern America), differing as follows:

The medial præscutal stripes are continuous and well-defined behind, the interspaces obscure, not bright yellow; pleura largely dark brown, this including also the outer faces of the coxæ. Wings similar, the ground-colour more grayish, the brown clouds less distinct and more extensive, pale grayish brown; these markings include a broad, continuous seam along and slightly before the cord and the apex of the wing; basal deflection of vein *Cu* close to the fork of *M*. Abdominal tergites with the cross-bands poorly defined, the sternites suffused with brownish.

June, 1917.

Holotype, ♂, Geneva Park, Grant, Colorado, altitude 10,000 feet, July 16, 1916 (L. O. Jackson).

Allotopotype, ♀, July 21, 1916.

Paratopotype, ♀, altitude 9,500 feet, July 22, 1916.

This fly will probably be found to be a valid species. It differs from *indigena* in the dusky brown body coloration, the gray wings with a more extensive brown seam, the position of the basal deflection of *Cu*₁, etc.

Tribe *Eriopterini*.

Genus *Erioptera* Meigen.

***Erioptera* (*Empeda*) *cinereipleura*, sp. n.**

Male.—Length 4 mm.; wing 4.5 mm.

Similar to *E. stigmatica* O. S. (Northeastern America) but the body-coloration clearer gray throughout. Antennæ darker, brown, the male with very long verticils.

Mesonotal præscutum gray, the pseudosutural foveæ and the tuberculate pits large and conspicuous, black, the latter closely approximated, separated by a distance less than the diameter of one. Pleura clear light gray, not reddish gray as in *stigmatica*. Legs with the femora yellowish basally, soon passing into brown. Wings grayish subhyaline, the stigma clear but distinct (fig. 6).

Abdominal tergites dark brown, contrasting with the yellow hypopygium.

Holotype, ♂, Hall Valley, Colorado, August 11, 1915 (E. J. Oslar).

***Erioptera* (*Empeda*) *noctivagans*, sp. n.**

Wings pale dusky with an indistinct brown seam along the cord.

Male.—Length 3.2 mm.; wing 4.7 mm.

Female.—Length 3.8–4.1 mm.; wing 5.6–5.8 mm.

Male.—Rostrum and palpi black. Antennæ black, the second and third antennal segments enlarged, the flagellum without exceedingly elongated verticils as in *stigmatica*, *cinereipleura*, etc. Head dark gray.

Thorax grayish brown, the humeral portions bright yellow; præscutum before the pseudosutural foveæ slightly brightened. Pleura and sternum dark coloured with a sparse, gray pruinosity;

pleural membranes yellowish brown. Halteres yellow. Legs with the coxæ and trochanters yellowish, remainder of the legs brown. Wings dusky gray, the stigma distinct; an indistinct, brown seam along the cord; veins dark brown. Venation as in fig. 5.

Abdomen light brown with a broad, blackish, sublateral stripe on either side of the tergites; hypopygium small, brownish yellow; sternites brown.

Female.—Slightly larger than the male, the basal segments of the antennæ not so enlarged; flagellar segments oval, those toward the tip more attenuated; humeral portions of the thorax whitish yellow; abdominal tergites with the sublateral stripes somewhat narrower; tergal valves of the ovipositor pointed at their apices.

Holotype, ♂, Maywood, Alexandria Co., Virginia, October 19, 1915, (W. L. McAtee); at light.

Allotopotypes, ♀, October 15, 1915.

Paratopotypes, 2 ♀s, October 16–19, 1915.

Type in the collection of the United States Biological Survey.

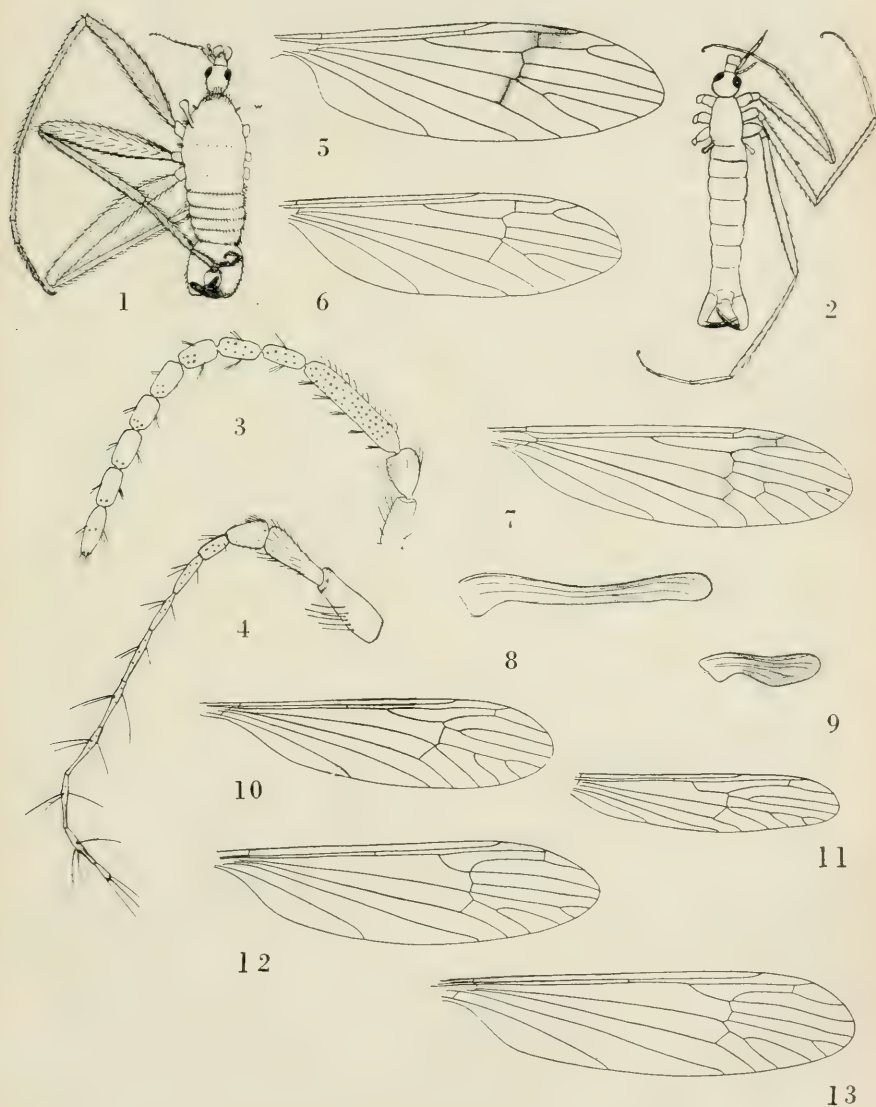
A key to the nearctic species of the genus Erioptera (Empeda).

1. Cell 1st M_2 closed; body-coloration yellow.....2.
- Cell 1st M_2 open; body-coloration gray or brown.....3.
2. Basal deflection of Cu_1 beneath the middle of cell 1st M_2 ; vein R_2 oblique, diverging strongly from vein R_3 (Eastern United States).....*nyctops* Alex.
- Basal deflection of Cu_1 before the fork of M ; vein R_2 not oblique, running parallel with vein R_3 (Western United States).....*alicia* Alex.
3. Wings gray with an indistinct, brown seam along the cord; verticils of the male antennæ not greatly elongated (Eastern United States).....*noctivagans*, sp. n.
- Wings subhyaline without a brown seam along the cord, only the stigmal region slightly darkened, verticils of the male antennæ greatly elongated.....4.
4. Body-coloration clear gray, including the thoracic pleura (Rocky Mt. Region).....*cinereipleura*, sp. n.
- Body-coloration reddish brown, the pleura reddish gray (Northeastern United States).....*stigmatica*, O. S.

Chionea Dalman.

These interesting subapterous crane-flies have been the subject of much discussion during the past hundred years. They were long supposed to be wingless but this is incorrect, the wings being present although greatly reduced (see fig. 1, *w*). The legs of the males of many species are strongly incrassated and hairy. The evolution of the group from full-winged ancestors has been indicated by the author in another paper (Proceedings Academy Natural Sciences of Philadelphia, p. 529, 530; 1916). The closest known relative of *Chionea* I believe to be the full-winged *Pterochionea bradleyi* Alexander (British Columbia), a fly that is interesting and suggestive in many ways. Its structure may be compared with that of *C. primitiva*, sp. n., when the relationships existing will be better understood.

The antennæ of *Pterochionea*, unlike the normal eriopterine crane-flies, have undergone a reduction in the number of the antennal segments, this reduction being brought about by a curious fusion of the five basal segments of the flagellum (fig. 3), that has been termed the fusion-segment. In *Pterochionea* this fusion-segment is elongated and the five sets of verticils are well-preserved. In *Chionea*, and, to a lesser extent, in *Crypteria* Bergroth, the fusion-segment has shortened up into a conical structure that is scarcely longer than the succeeding flagellar segment, and the five sets of verticils are either lost or very reduced. Beyond the fusion-segment in *Pterochionea*, *Crypteria* and *C. primitiva*, there are nine flagellar segments, thus accounting for the sixteen segments of the normal eriopterine organ. In order to determine, if possible, how the further reduction in segments in *C. valga*, *C. nivicola* and the other species had been brought about, Mr. C. W. Johnson has very kindly examined the types and fresh metatypical specimens of *C. valga* Harris in the collection of the Boston Society of Natural History. Under the date of March 11, 1917, he writes in part: "Under the binocular and with a fresh specimen I seem to see traces of segmentation in the three conspicuous joints of the flagellum, with 12 verticils and bristles, showing, as you say, nine. In the old specimens, including the type, I cannot make out clearly the weaker segmentation, but the verticils seem to be the same; all of the specimens have the three long bristles on the



terminal segment, one a little below the apex." The sketch supplied by Mr. Johnson indicates that the first of the flagellar segments has two of these weak segments, the next two have three each while the short terminal segment is not further divided, these totalling up to the nine distinct segments in *C. primitiva*. It will be seen from the figures (fig. 3) that the flagellar segments in *Pterochionea* are all short-cylindrical; in *C. primitiva* (fig. 4) the basal segments are short with short verticils, these segments gradually becoming more attenuated and provided with longer bristles, the last segment shorter with three terminal bristles.

The male hypopygia of *Chionea* and *Pterochionea* show a peculiar, powerful type of genitalia, consisting of a massive pleurite and a single elongate pleural appendage (figs. 1, 2). In *Crypteria* the appendages are small, two in number and quite normal. Thus in the structure of the antennæ, *Chionea* comes closest to *Crypteria*, but in the hypopygium the condition is remarkably close to *Pterochionea*. There can be little doubt but that these two genera, with perhaps others yet to be discovered, are the direct ancestors of our familiar snow-flies, *Chionea*. As stated in another paper, this interpretation will place the group at the very end of the eriopterine series.

***Chionea primitiva*, sp. n.**

Size large; form stout; entire body hairy; head elongated; antennæ with nine flagellar segments beyond the fusion segment.

Male.—Length 5.8 mm.; diameter across thorax, 1.5 mm.

Mouth parts yellowish brown; palpi dark brown. Antennæ elongate, the scapal segments yellowish brown, the flagellum darker; first segment of the scape a little broader basally, with a group of long bristles on the outer face; second segment narrowed, basally enlarged, darkened and provided with bristles beyond the basal portion; fusion-segment of the flagellum conical, with short verticils; it is shorter than the second segment of the scape but longer than the following segment of the flagellum; beyond the fusion-segment are nine distinct segments, increasing in length toward the tip of the organ, the verticils also increasing in length from the base outward, those of the first four segments shorter than the segments that bear them, the others very long, longer than the segments that bear them; the terminal segment is smaller,

enlarged apically and bearing at its tip three very long bristles. The frontal prolongation of the head bears a group of about eight stout bristles. The head behind the eye is large, elongated and prominent, bearing many strong verticils. Head yellowish.

Thorax reddish yellow, the region of the mesonotal scutum and scutellum with abundant strong black bristles. Halteres prominent, light yellow. Legs with all the femora enlarged, yellowish; tibiae yellow; tarsi black. Wings very small but evident (fig. 1, w) about as long as the third flagellar segment of the antennae.

Abdomen stout, the tergites with their caudal portions provided with abundant long, black bristles; sternites with similar but shorter hairs. Male hypopygium powerful, the pleurites stout, the appendage enlarged basally and provided with an inner basal tooth, in the angle of which is a tuft of stout, black hairs; the appendage is shorter than the pleurite.

Holotype, ♂, Cascade, Owasco Lake, Cayuga Co., New York, November 15, 1915 (Bishop and Crosby).

***Chionea noveboracensis*, sp. n.**

Body-coloration dark brownish gray; ovipositor of the female very elongated.

Female, somewhat shrunken, length about 3.5 mm.

Mouth parts and palpi brownish black. Antennae black, the fusion-segment of the flagellum short; remainder of the flagellum broken. Head very dark brown with a gray pruinosity and numerous dark bristles.

Thorax brownish gray. Halteres elongate, brownish yellow. Wings very small but evident, dusky gray. Legs with the coxae prominent, dark brown; femora and tibiae brown, the tarsi dark brown; femora not incrassated.

Abdomen very dark brown with a gray bloom, the tergites with long, golden hairs on the caudal portion. Female ovipositor exceedingly long and slender, the tergal valves much longer than the sternal pair, slightly upcurved, narrowed and obtuse at their tips. The tergal valves of the ovipositor are about as long as the thorax.

Holotype, ♀, Coy Glen, Tompkins Co., New York, altitude 800 feet, Feb. 25, 1917 (R. C. Shannon).

The type is in the collection of the collector.

***Chionea gracilis*, sp. n.**

Size small; form very long and slender; head round; femora not swollen.

Male.—Length 3.9 mm.; diameter across the thorax, .6 mm.

Mouth parts and palpi yellowish. Antennæ yellow, the scapal segments long and slender, the flagellar fusion-segment long and slender, conical. Head rounded, yellowish.

Thorax brownish yellow. Halteres yellow. Legs yellow, the tarsi scarcely darkened.

Abdomen long and slender, about twice the length of the combined head and thorax. Male hypopygium not conspicuously enlarged, the pleurites slender, the appendage very long and slender, curved, narrowed at the tip and nearly as long as the pleurite.

The body and legs are provided with a sparse covering of short, pale hairs.

Holotype, ♂, Ithaca, Tompkins Co., New York, December 21, 1914.

The description of *C. scita* Walker indicates a form that is longer than *C. valga* Harris (*aspera* Walker) and having black antennæ. It seems probable that *C. scita* is the female of *C. valga*, the females of *Chionea* having the legs more slender than those of the male, and with the body more elongate and slender (see Emerton's figures, in Johnson's paper, "The Snow-fly, *Chionea valga* Harris," *Psyche*, vol. 14, p. 43; 1907).

A key to the Eastern American species of the genus Chionea.

1. Body-coloration gray.....*noveboracensis*, sp. n.
Body-coloration reddish or yellowish.....2.
2. Form long and slender; (length of the male less than 4 mm.; diameter across the thorax about .6 mm.); all the legs elongate, slender, not at all thickened.....*gracilis*, sp. n.
Form stouter; (length of the male over 4 mm.; diameter across the thorax 1 mm. or over); at least the posterior legs of the male incrassated.....3.

3. Antennæ with 12 segments; all the femora of the male incrassated; size larger, (length of the male about 6 mm.; diameter across the thorax 1.5 mm.).....*primitiva*, sp. n.
Antennæ with 7 segments; the hind femora of the male conspicuously incrassated; size smaller (length of the male about 5 mm.; diameter across the thorax about 1 mm.).....*valga* Harris

Tribe *Limnophilini*.

Genus *Limnophila* Macquart.

***Limnophila subaptera*, sp. n.**

Subapterous; wing of the male longer than the halter.

Male.—Length about 12 mm.; wing 2.5 mm.

Rostrum and palpi dark brown. Antennæ dark brown, apparently with only 15 segments; segments of the flagellum short-oval with stout, black bristles and a sparse, white pubescence. Head grayish with scattered yellowish bristles.

Thoracic dorsum grayish with three indistinct grayish brown stripes, the lateral pair running back on to the scutum; sides of the scutellum yellowish. Pleura gray, the dorso-pleural membranes brownish yellow. Halteres brown, paler basally. Legs long and slender; outer faces of the coxæ grayish except the fore coxæ which are pale yellow; femora pale at the extreme base, the remainder dark brown; tibiæ brownish yellow, the apices darker brown; tarsi brown. Wings subatrophied, long and narrow, longer than the halteres (fig. 8), pale basally, darker brown apically.

Abdomen long and slender, brownish gray, the segments narrowly and indistinctly margined with paler; hypopygium with golden-yellow hairs.

Holotype, ♂, South Fork of the Kaweah R., California, below 5,000 feet, July 25, 1915, (J. Chester Bradley).

Type in the collection of Cornell University.

Similar to *L. aspidoptera* Coquillett (New Mexico) and like this species having apparently but 15 antennal segments, the reduction being brought about by the fusion or very close approximation of the last two segments; the three basal antennal segments in *aspidoptera* are the more brightly coloured. The most obvious difference is in the elongate wings of the present species, these

being about one and one-half times the length of the halteres; in *aspidoptera* (fig. 9) the wings are short and broad, and extend to about two-thirds the length of the halteres.

***Limnophila (Prionolabis) cressoni*, sp. n.**

Dark brown with the thoracic stripes indistinct; wings with narrow, grayish brown seams to the cross-veins and deflections of veins.

Male.—Length 8 mm.; wing 10.6 mm.

Female.—Length 10 mm.; wing 10.8 mm.

Rostrum short, dark brown; palpi dark brown. Antennae short, dark brown; the flagellar segments very short, almost rounded, with an abundant white pubescence. Head gray.

Thoracic dorsum dark brown with a sparse, yellowish gray bloom, the prescutal stripes poorly defined. Pleura clearer gray, the dorsal-pleural membranes brownish. Halteres dull yellow, the knobs a little darker. Legs with the coxae and trochanters dull brownish yellow, darkened toward their apices, this dark tip broadest on the fore and middle femora, narrowest on the hind femora; tibiae brown, the tips narrowly dark brown; tarsi brown. Wings with a pale, brown suffusion; stigma dark brown; broad, grayish brown seams along the cord, the outer end of cell *1st M*₂ and at the origin of the sector. Venation (fig. 7) $\cdot R_{2+3}$ about as long as the basal deflection of *Cu*₁.

Abdomen brown, the terminal segments darker. Hypopygium of the male with the ninth tergite having a broad, V-shaped median notch that is bordered with pale reddish brown; ventral pleural appendage with a few scattered teeth that are not prominent.

Female quite similar to the male, the ovipositor with elongate, acute, nearly straight tergal valves; sternal valves elongate, only a little shorter than the tergal pair.

Holotype, ♂, Lagunitas Canyon, Marin Co., California, March 29, 1908, (E. T. Cresson, Jr.).

Allotopotype, ♀.

The types are in the collection of the American Entomological Society, Philadelphia.

This fly differs from the only described regional member of

the subgenus (*L. barberi* Alex.) in its larger size and different coloration.

Tribe *Pediciini*.

Genus *Tricyphona* Zetterstedt.

***Tricyphona degenerata*, sp. n.**

Cell *1st M*₂ of the wings open by the atrophy of the outer deflection of vein *M*₃; wings small, somewhat degenerate, in the male less than 5 mm. in length.

Male.—Length about 4.8 mm.; wing 3.8 mm.

Head lacking in the type.

Pronotum light yellow. Mesonotum yellowish, the praescutum with a broad, dark brown, median stripe and shorter lateral stripes that continue back on to the anterior half of the scutal lobes: scutellum and the remainder of the scutum yellow; postnotum with a very sparse, grayish pruinosity. Halteres pale, the knobs a little darkened. Legs with the coxae elongated, dull yellowish; trochanters yellow, the margin at the junction with the femora darkened; femora and tibiae brownish yellow the tips of the latter narrowly darkened; last two tarsal segments and the claws dark. Wings long and slender, small, degenerate, although with a complete venation; pale yellowish subhyaline, the veins yellowish brown; stigma indistinct. Venation (fig. 11) *Rs* angulated at its origin; cross-vein *r* about two-thirds the length of that portion of *R*₁ beyond it; petiole of cell *R*₄ longer than the *r-m* cross-vein; forks of *M* subacute; cell *1st M*₂ open by the atrophy of the outer deflection of *M*₃.

Abdomen dark brown, the hypopygium more reddish brown.

Holotype, ♂, Geneva Park, Grant, Colorado, altitude 9,500–10,000 feet, July 22, 1916, (E. C. Jackson).

The only other *Tricyphona* in the Nearctic fauna with the cell *1st M*₂ open by the atrophy of the outer deflection of vein *M*₃, is *T. aperta* Coq. (fig. 10), a full-winged fly that is much larger than our present species. A comparison of figures 10 and 11 will show the chief differences between the species. The condition in the present species is one of degeneration, the wing measuring but 3.8 mm.; the even more degenerate *T. hannai* Alex. (Pribilof Islands) represents the culmination of this tendency in the known species of the genus.

Genus *Rhaphidolabis* O. S.***Rhaphidolabis (Rhaphidolabis) sessilis*, sp. n.**

Size large (wing of the female over 8.5 mm.); body-coloration gray, the mesonotal præscutum with three dark brown stripes; wings with the cross-vein *r* at the tip of *R*₁; cell *R*₂ sessile or sub-sessile.

Female.—Length 6.8 mm.; wing 8.8 mm.

Rostrum and palpi dark brown. Antennæ brownish, the scape with a gray bloom; flagellar segments oval, dark brown. Head gray.

Mesonotum light gray, the præscutum with three dark brown stripes of which the median one is slightly darker and broader, becoming obsolete just before the transverse suture; lobes of the scutum brownish. Pleura gray, the dorsol-pleural membranes more brownish. Halteres pale, the knobs brown. Legs with the coxæ dull yellow, the outer faces with a gray bloom that is heaviest on the hind coxæ; remainder of the legs dark brown, the femora brightened basally. Wings with a pale gray suffusion, highly iridescent; stigma light brown; veins brown. Venation (fig. 12) *Rs* short, strongly arcuated; cross-vein *r* at the very tip of *R*₁; cell *R*₂ sessile or very short-petiolate.

Abdomen dark brown; valves of the ovipositor strongly reddish yellow.

Holotype, ♀, Hall Valley, Colorado, August 11, 1915, (E. J. Oslar).

This fly is readily separated from all the described species (see the author's key to the Nearctic species of the genus, *Proceedings Academy Natural Sciences Philadelphia*, p. 541, 542, 1916), in its large size and the position of the radial cross-vein.

***Rhaphidolabis (Rhaphidolabis) major*, sp. n.**

Size large (wing of the female over 9 mm.); body-coloration pale brown, the præscutum with a broad, dark brown median stripe.

Female.—Length 7.8 mm.; wing 9.4 mm.

Rostrum yellowish brown, the palpi dark brown. Antennæ dark brown. Head brownish gray.

Pronotum light brown, darker brownish medially. Mesonotal

præscutum light fawn-brown with a very dark brown median stripe and much paler lateral vittæ; the conspicuous median stripe is broadest in front, gradually narrowed behind, ending before the transverse suture and narrowly bisected behind; lateral præscutal stripes and the lobes of the scutum paler brown; remainder of the scutum, the scutellum and postnotum reddish yellow, the latter browner on the caudal half. Pleura pale reddish brown, very sparsely dusted with whitish. Halteres yellow, the knobs brown. Legs with the coxæ dull yellow; trochanters similar, their margins blackened; femora dull yellow, the tips narrowly brown; tarsi dark brown. Wings yellowish gray subhyaline, strongly iridescent; stigma very pale; veins dark brown. Venation (fig. 13) *Rs* long, almost straight; cross-vein *r* removed from the tip of vein *R*₁ to a distance about equal to its own length; *R*₂₊₃ shorter than the radial cross-vein.

Abdomen grayish brown with a reddish cast that is best defined on the caudal margins of the terminal sternites; ovipositor reddish yellow.

Holotype, ♀, Horseman Creek, Geneva Park, Grant, Colorado, altitude 10,200 feet, July 19, 1916, (L. O. Jackson).

This is the largest species of the genus.

EXPLANATION OF PLATE XII.

Fig. 1. *Chionea primitiva*, sp. n.; ♂, legs of the right side not figured; *w* = wing.

Fig. 2. *C. gracilis*, sp. n.; ♂, dorsal aspect, legs of the left side not figured.

Fig. 3. Antenna of *Pterochionea bradleyi* Alexander; ♂.

" 4. The same, *Chionea primitiva*; ♂.

" 5. Wing of *Erioptera noctivagans*, sp. n.; ♂.

" 6. " *E. cinereipleura*, sp. n.; ♂.

" 7. " *Limnophila cressoni*, sp. n.; ♀.

" 8. " *L. subaptera*, sp. n.; ♂.

" 9. " *L. aspidoptera* Coquillett; ♂.

" 10. " *Tricyphona aperta* Coquillett; ♂.

" 11. " *T. degenerata*, sp. n.; ♂.

" 12. " *Rhaphidolabis sessilis*, sp. n.; ♀.

" 13. " *R. major*, sp. n.; ♀.

SUNFLOWER INSECTS IN VIRGINIA AND CONNECTICUT

BY T. D. A. COCKERELL, BOULDER, COLO.

Last August I visited Mr. S. A. Rohwer, at Falls Church, Va., and with his assistance obtained a series of insects from the sunflowers (*Helianthus annuus* var. *zonatus*) growing in his garden. The list is as follows:

(A) Visiting the Flowers.

Lepidoptera: *Anosia plexippus* L., sucking.

Hymenoptera: *Melissodes dentiventris* Smith, both sexes; *Melissodes caliginose* Cress., ♀; *Apis mellifera* L., worker; *Bombus consimilis* Cress., worker; *B. americanorum* Fb., worker; *Halictus capitosus* Sm., ♀s.

(B) On Foliage.

Hymenoptera: (Determined by Dr. W. M. Wheeler, who was present at the time). *Formica pallidefulva* Latr. and var. *nitidiventris* Emery.

Hemiptera: (Determined by Mr. O. Heidemann). *Entylia concisa* Walk., breeding on leaves; *Ilnacora stalii* Reuter, breeding on leaves.

In addition, a species of aphid (*Macrosiphum*) was found, of which we can only say now that it differs from any recorded from *Helianthus*.

On Sept. 11, Dr. W. M. Wheeler very kindly collected insects on sunflowers (*Helianthus annuus* var. *macrocarpus*) at Colebrook, Conn., (alt. 1200 ft.), and sent me the specimens. The list is as follows:

Hymenoptera: *Myrmica scabrinodis* subsp. *schenki* var. *emeryana* Forel (Oct., Wheeler); *Bombus consimilis* Cress., six workers having the yellow pubescence brighter than in examples from Garrison, N.Y.; *B. fervidus* Fb., one male and six workers; *Melissodes dentiventris* Sm., ♀; *Megachile latimanus* Say, ♀.

Hemiptera: *Lygus pratensis* L., and a species not recognized.

Diptera: *Eristalis*, *Syrphus* and *Sphaerophoria*.

At Boulder, Colorado, in September, 1916, I observed numerous moths one evening visiting the red sunflowers. On collecting a number, I found they were nearly all *Feltia subgothica* Haw.

June, 1917

A COMPARISON OF THE ANTENNÆ OF THE GRYLLO-
BLATTIDÆ AND EMBIIDÆ TO DEMONSTRATE
THE RELATIONSHIP OF THESE TWO
GROUPS OF INSECTS.

BY G. C. CRAMPTON, PH. D.*, AMHERST, MASS.

It has been maintained that the Grylloblattidæ are descended from Blattid-like forms, by some investigators (Walker, 1914, and others), while the writer (Crampton, 1915-1916) would derive them from Plecoptera-like forebears, through Embiid-like ancestors. It is of the utmost importance to determine the exact affinities of the Grylloblattids, if we wish to trace the genealogy of the Orthopteroid groups (i. e., the Tettigonids, Gryllids, Locustids, etc.) since the Grylloblattids have departed the least of any living insects from the ancestral condition of the Orthoptera and their immediate relatives, and, therefore, furnish us with the most reliable evidence available for determining the affinities of Orthopteroid insects. On this account, I would present the evidence to be gained from comparative anatomy, in a series of papers in which the various external structures of the Embiids and Grylloblattids are compared part for part, in an endeavor to demonstrate that the Grylloblattids are more closely related to the Embiids than to any other group of lower Pterygotan insects, and that the Grylloblattids are consequently to be derived from Plecoptera-like ancestors through more immediate ancestors which closely resembled living Embiids.

In the present paper, which is the first of the series, I would present the evidence of close relationship between the two groups, to be gained from a comparison of their antennæ. Unfortunately, the accompanying rough sketches were made from loaned material, at a time when I did not realize the importance of making a more detailed study of the antennæ, since the specimens were borrowed primarily for the purpose of examining the thoracic sclerites—which furnish one of the most reliable sources of determining the relationships of insects, from the standpoint of comparative anatomy. The drawings, however, will be found sufficiently accurate for all practical purposes.

* Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.
June, 1917.

The close correspondence in the number of antennal segments occurring in a female *Grylloblatta* and a female *Embia* is most striking. In the female *Embia* which I was able to examine, through the generosity of Major Imms, twenty-seven antennal segments

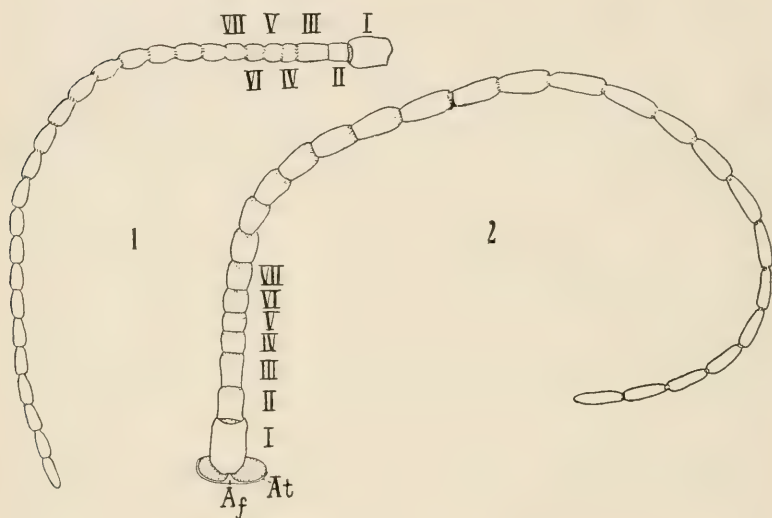


Fig. 9.—Lateral views of left antenna of (1) *Embia major* Imms, (2) *Grylloblatta campodeiformis* Walker.

occur (Fig. 9, 1), and in the female *Grylloblatta*, kindly loaned me by Dr. Walker, twenty-eight antennal segments occur (Fig. 9, 2). Imms, 1913, records a maximum of *twenty-nine* antennal segments for females of *Embia major* Imms; while Walker, 1914, records exactly the same number of segments (namely *twenty-nine*) as the maximum for females of *Grylloblatta campodeiformis*, Walk., thus showing an astonishingly close agreement in the number of antennal segments occurring in the two groups of insects. Indeed, there is a greater variation in the number of antennal segments among insects belonging to the same order, or even family, elsewhere in the lower Pterygota, and, coupled with other anatomical features no less striking, this clearly points to a remarkably close relationship between the Embiids and Grylloblattids.

In comparing the antennæ of the Grylloblattids with those of the typical Blattids (e. g., the antennæ of *Periplaneta americana* Linn) we find no such close correspondence in the number of segments, since the typical Blattid antenna is composed of considerably over a hundred more segments than are present in the antenna of *Grylloblatta*. Furthermore, the segments of a Blattid's antenna are of a very different type from those of a Grylloblattid's antenna, the smaller proximal antennal segments being more annular in outline in the Blattids. In the antennæ of the Embiids and Grylloblattids, on the other hand, there is not only a remarkable correspondence in the number of segments composing the antennæ, but the similarity extends even to the relative size and the outline of the antennal segments themselves.

In both *Embia* (Fig. 9, 1) and *Grylloblatta* (Fig. 9, 2) the scape (Seg. I) is much larger than the pedicel (Seg. II). Furthermore, the pedicel (Seg. II) is of about the same width as the postpedicel (Seg. III), but is shorter than the postpedicel (Seg. III) in both *Embia* (1) and *Grylloblatta* (2). In both insects, the postpedicel (Seg. III) is longer than the succeeding two segments. (Segs. IV and V) which are somewhat annular, or broader than long, in outline. The sixth segment (Seg. VI) is slightly longer than the two preceding it, in both *Embia* and *Grylloblatta*, while here is a slight increase in length in the seventh segment in both insects. The segments from this point on, gradually become longer, slenderer, and more cylindrical in both insects, and the correspondence, even to the minutest details, is so striking, that even the veriest tyro could not fail to perceive the remarkable similarity in the antennæ of these two insects. On the other hand, one has but to glance at the antennæ of a typical Blattid, to convince himself that the segments of its "whip-lash" antenna are of a very different type from those of *Grylloblatta*; and if any conclusions are to be drawn from a comparative study of the antennæ, they would clearly point to a remarkably close relationship between the Grylloblattids and Embiids, and a much more distant relationship to the Blattids.

It might be mentioned in passing, that the antennæ are situated nearer to the base of the mandibles, and below the eyes, in Embiids and Grylloblattids; while in the typical Blattids, the

antennæ are located higher up in the frontal region, between the eyes. The eyes of Embiids and Grylloblattids are similar in outline, and do not extend upward on the sides of the head; while in the typical Blattids, the eyes are more "reniform," and extend for a considerable distance upward along the sides of the head. The head is typically opisthognathous (i. e., mouthparts directed backward) in Blattids, while in both Embiids and Grylloblattids it is more prognathous (i. e., mouthparts directed forward). The cervical sclerites are astonishingly similar in Embiids and Grylloblattids (as will be brought out in a paper now ready for publication) while these neck plates in both groups differ markedly from those of the Blattids, and the same is true of the thoracic sclerites in general. The bodies of the Embiids and Grylloblattids are slender, while those of typical Blattids are broader and more flattened. It would be possible to cite many more instances of striking structural similarity between the Grylloblattids and Embiids, (in points wherein both differ markedly from the Blattids) but it is preferable to take up these structures point by point in a series of papers in which they can be discussed more in detail, and in which the points brought out can be illustrated by numerous figures—which after all are more convincing than bare statements of facts, since they enable one to form an opinion for one's self concerning the features in question.

The Grylloblattids are undoubtedly also very closely related to the Phasmids such as *Timema*, and in all probability both Phasmids and Grylloblattids were derived from forms quite similar to the Embiids. The Phasmodidæ (*Phasmodes ranatiformis*, Westw.) are insects very closely related to the Tettigonids ("Locustidæ") which have retained many features suggestive of Phasmid affinities, and beyond a doubt, a comparative study of *Phasmodes*, *Grylloblatta* and *Timema*, would be extremely instructive from the genealogical standpoint. It might also be mentioned that the Phylliidæ are too closely related to the Phasmids to be considered as a distinct order (the "Phyllioptera") as I formerly believed, since such Phasmids as *Ectatosoma* are quite closely related to the Phylliids (as can be seen by comparing the males of *Phyllium* with these Phasmids), so that I would now regard the Phylliids as a sub-order of the Phasmid group, rather than as a distinct order.

The insects most closely related to the Embiids are the Plecoptera, which are probably the nearest living representatives of the ancestral Pterygota, so that the Embiids were doubtless descended from Plecoptera-like ancestors. From these "Plecopteroid" ancestors the Forficulid line of development branched off in one direction, while that of the Embiids branched off in the other direction, and somewhere between the two (though doubtless nearer to the Embiid than to the Forficulid line) arose the Grylloblattid and Phasmid line of development. Somewhere between these in turn arose the Phasmodid, Tettigonid and Gryllid lines of development, while the Phylliids branched off from the Phasmid line of development. From this, it may be seen that the Blattids are not near the direct line of descent of the Grylloblattids, Phasmids, etc.; but this point will be more fully discussed elsewhere.

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1915. Crampton. The Thoracic Sclerites and the Systematic Position of *Grylloblatta campodeiformis*, etc.; Ent. News, 26, p. 337.
1916. Crampton. The Lines of Descent of the Lower Pterygotan Insects, etc.; Ent. News, 27, p. 244.
1914. Walker. A New Species of Orthoptera, Forming a New Genus and Family; Canadian Entomologist, 46, p. 93.

Dr. Walker will shortly publish an article dealing with both sexes of *Grylloblatta*.

ABBREVIATIONS.

- Af. Antennifer, or process bearing the antenna.
At. Antennale, or ring at base of antenna.
I. First antennal segment, or scape.
II. Second antennal segment, or pedicel.
III. Third antennal segment, or postpedicel.
IV. Fourth segment of antenna, etc.

TWO NEW SPECIES OF DICYPHUS FROM PORTO RICO, (MIRIDÆ, HETEROPTERA).

BY EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

Specimens of the following new species have been received from Mr. R. T. Cotton, stationed at Rio Piedras, Porto Rico, where he finds them injurious to tobacco plants.

Dicyphus prasinus, n. sp.

Resembling *D. minimus* Uhl., but much larger and with greater width at the base of the head.

Head distinctly narrowed anteriorly, widest behind the eyes, with short, inconspicuous hairs. Eyes large. Front very convex and prominent. Clypeus prominent. First joint of antennæ stout and distinctly longer than the distance between the eyes, second joint as long as the head and pronotum together, third joint about equal to the second, and fourth joint equal to or slightly longer than the first. Rostrum extending to or beyond the hind coxæ. Pronotum wider than long, posterior lateral angles acute, posterior margin deeply emarginate, hairs or bristles on pronotum more prominent than those on head. Callosities of pronotum transverse, their posterior margin at the middle of the pronotum, median line impressed. Pronotum deeply concave or grooved at base of callosities. Colour: head, pronotum and scutellum pale yellow to yellowish green; eyes dark; clypeus and first antennal joint black; remainder of antennæ pale yellow to testaceous; a broad, dark lateral stripe on head behind eyes. Elytra subhyaline with small, fuscous spots, especially on the inner half. A large, irregular fuscous spot near costal margin of each wing-cover and midway between base and apex. Membrane more or less clouded and veins fuscous. Abdomen pale green, legs yellowish. Length to tip of hemelytra, ♀ $3\frac{1}{4}$ - $3\frac{1}{2}$ mm., ♂ 3 - $3\frac{1}{4}$ mm. Width of pronotum $\frac{3}{4}$ mm.

Described from three females and ten males, all of which are in the collection of the U. S. National Museum.

Dicyphus luridus, n. sp.

This species may readily be distinguished from others of the genus by its short head and lack of colour markings.

June, 1917

Head short, space between the eyes and the pronotal collar short, about equal to the width of the collar. Eyes large. Front very convex, clypeus prominent. Rostrum extending to hind coxae. Basal joint of antennae stout, short, slightly less than the width between the eyes, with few stout bristles, second joint only slightly longer than length of pronotum, third about as long as the second, fourth longer than the first. Collar of pronotum wide, callosities transverse with posterior margin at middle of pronotum. Posterior margin of pronotum nearly truncate, posterior angles rounded. Scutellum large. Elytra evenly clothed with fine, short hairs. Length to tip of elytra 3.5-4 mm. Width of pronotum 1 mm. General colour pale yellowish green, but varying from yellow to green, normally nearly unicolorous. Basal joint of antennae yellow or testaceous at base and apex, making a dark band in the middle, apex of other segments pale, otherwise dark. Elytra subhyaline without distinct spots or colour markings, more or less smoky. Veins of membrane fuscous. Abdomen green, legs more or less spotted with fuscous.

Described from two females and seven males all of which are in the collection of the U. S. National Museum.

It is gratifying to learn that the Dominion Government has recently appointed Dr. C. Gordon Hewitt to be Consulting Zoologist, in addition to his duties as Chief of the Entomological Branch of the Department of Agriculture. The object of this new appointment is to enable him to advise the Government in all matters relating to the protection of birds and mammals, and dealing with any injurious kinds. It is not intended that this should in any way interfere with the performance of his valuable duties as Dominion Entomologist.

BOOK NOTICE.

Check List of the Lepidoptera of Boreal America, by Wm. Barnes, S. B., M. D. and J. McDunnough Ph. D., Decatur, Ill., 1917.

The publication of a new faunal check-list may well be likened to adding another milestone along the roadside of science, and

Lepidopterists looking over this latest list and then glancing backward at its excellent predecessor, Dr. J. B. Smith's List of 1903, may well be satisfied with the progress made.

In the matter of species, over 8,500 are now included against about 6,800 in Smith's List, an increase of 1,700 species or 25%, which in itself indicates much activity. But more important still has been the work of specialists in working out revisions of the various groups from a world-wide standpoint, which, while necessitating many changes, is bound to result in a more stable classification. Among the works referred to are those of Rothschild & Jordan on the Sphingidae; Sir Geo. Hampson on the Arctiidae and Noctuidae; and of Mr. L. B. Prout on the Geometridae, in addition to the revisions in the partially completed "Genera Insectorum" and "Macro-Lepidoptera of the World."

Embodied in the new list are not only the conclusions of these eminent authorities, but also the results of several years' study of the Barnes' collection and existing types in other North American collections, and finally changes had to be made to accord with the rules of nomenclature adopted by the International Congress.

The changes in many instances have been very drastic, but with the excellent index, which occupies almost as many pages as the list proper, little trouble will be experienced in finding the species looked for. As a compensation for having to forget a lot of names and learn new ones, it will give the older collectors a feeling of pleasure to find the "swallow-tails" are all *Papilio*s again, the "whites" are *Pieris*, instead of *Pontia*, and our friend the milk-weed butterfly is *archippus* again and its genus is *Danaus*, which sounds familiar even if the spelling be not.

The check-list is valuable to everyone interested in North American Lepidoptera, and the few lines headed "Exchange" on the fly-leaf at the back convey the good news that the same authors purpose publishing a full catalogue of North American Lepidoptera. It is hoped that the request for information will meet with a general and cheerful response.

The price of the Check-List is \$2.00, and copies are obtainable from Dr. Wm. Barnes, Decatur, Ill. A. F. W.

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POPULAR AND PRACTICAL ENTOMOLOGY.

THE DEATH-FEIGNING INSTINCT.

BY E. MELVILLE DUPORTE, MACDONALD COLLEGE, QUE.

Many widely different animals possess the instinct of feigning death. The sand-hopper, a terrestrial amphipod, and the pill-bug (*Armadillidium*) are well-known examples among the Crustacea. That many Myriapods will coil up and remain perfectly still on being touched is well known to all acquainted with the habits of the common millipedes. Among the spiders, the Epeiridae or orb-weavers are perhaps the ones which most commonly feign death on being disturbed.

Though rare the instinct occurs among the vertebrate animals. Certain fishes and amphibians are known to feign death. Two noteworthy examples of death-feigning birds are the partridge of the pampas of the Rio de la Plata and the tern of Pekinese Island.

Among mammals one of the best known examples is that which has enriched the "American language" with the expressive term "playing 'possum." Other well known examples are the fox and the armadillo.

It is among insects, however, that the death-feigning instinct is most widely distributed, especially among the Coleoptera and Hemiptera. The active flyers such as the Diptera, Hymenoptera and Lepidoptera seldom feign death.

The term "feigning death"—an unfortunate one as it connotes a consciousness which does not exist—is used to designate the assumption by an animal, when disturbed, of a rigid state which may be of momentary duration or may last upwards of an hour. The attitude of the feigning animal varies, but is very seldom the same as the attitude of the dead insect. The motionless condition and the rigidity due to the contraction of the muscles are the chief characteristics of the death feint, and for this reason I have included under the term all rigid motionless attitudes which are the result of a reaction to a shock stimulus. Given so broad

an interpretation the death feint among insects falls into one or other of the three divisions which follow:

1. *The insect on receiving a shock becomes rigid without releasing its hold.*

Certain caterpillars will hold on to a twig by one or more pairs of prolegs, and elevate their bodies, assuming more or less grotesque rigid attitudes in which they will remain for a considerable time. Perhaps the best known examples are the caterpillars of the Sphinx Moths and of certain geometers. In these cases the insect seems to come to rest naturally in the immobile attitude, without the stimulus of a shock, the contraction of the muscles being probably due to an internal stimulus resulting from the active metabolism which takes place after the insect has eaten. If such is the case these reactions cannot properly be described as death feints. In other insects, however, a similar attitude can be definitely brought about by a shock. Thus if the yellow-necked apple-tree caterpillar (*Datana ministra*) be disturbed it will raise both ends of its body with a jerk, retaining hold of the twig by means of the four pairs of anterior prolegs.

2. *The insect when disturbed rolls itself into a motionless ball.*

This habit seems to be common among terrestrial forms rather than among arboreal ones. The ruby wasps or cuckoo-flies (*Chrysididæ*) lay their eggs in the nests of wasps and bees. If attacked by their hosts the ruby wasps bend their abdomen beneath the thorax, and in this attitude resemble a small, metallic ball.

Sometimes the head and abdomen are bent back above the thorax. Thus Kirby and Spencer say of *Silpha thoracica* "when alarmed it turns its head and tail inwards until they are parallel with the trunk and abdomen and give its thorax a vertical direction, when it resembles a rough stone."

Certain of the rove beetles (*Staphylinidæ*) combine both attitudes, bending the head beneath the thorax and the abdomen above the elytra.

Many cutworms and other caterpillars also roll themselves into a motionless ball when disturbed.

3. *The insect releases its hold, contracts its legs and antennæ and falls to the ground, where it usually remains motionless and apparently dead.*

This is the condition to which the term "death feint" is usually applied, but it is difficult to draw a sharp line of demarcation between this and the reaction of the ruby wasps, between the attitude of ruby wasps and that of the carrion and rove beetles, or between the attitude of these beetles and the rigid attitude of the yellow-necked apple-tree caterpillar.

The death feint varies greatly in degree. On the one hand we have certain insects which when disturbed remain momentarily quiet, becoming active again almost immediately. On the other hand we have De Geer's classical example, *Anobium pertinax*. Kirby and Spence referring to this insect and in part quoting De Geer say: "All that has been related of the heroic constancy of American savages when taken and tortured by their enemies scarcely comes up to that which these little creatures exhibit. You may maim them, pull them limb from limb, roast them alive over a slow fire, but you will not gain your end; not a joint will they move nor show by the least symptoms that they suffer pain,"* and they naively continue: "do not think, however, that I ever tried these experiments upon them myself, or that I recommend you to do the same." In spite, however, of the admonition of the learned authors of the *Introduction of Entomology* several workers have repeated these experiments and found that the case of *Anobium* is an extreme one and that the majority of feigning insects gradate between this extreme and the other in which the loss of activity is but momentary. In *Tychius picirostris*, for example, the writer finds that while the legs and antennæ of the feigning insect may be cut off without eliciting any symptoms of activity, more drastic disturbances such as decapitation or severing the trunk always cause the insect to resume its activity. In the same insect it was found impossible to elicit the feigning response on a hot surface, and an insect in the death feint placed on a hot surface immediately became active and tried to escape. Cold, on the other hand, very greatly increased the duration of the feint.

*Compare Holmes on the feint of the Pekinese tern. "You may pull them about, stretch out their legs, neck or wings and place them in the most awkward positions, and they will remain as limp and motionless as if really dead. They will even suffer their wing and tail feathers to be plucked out one by one without a wince."

The duration of the feint may be momentary or it may exceed a hour. There is little uniformity either in individuals of the same species or in the same individual during successive feints. I have never found any gradational relation between the duration of successive feints, but Fabre found that in the beetle *Scarites gigas* the duration increased with each successive feint. With *Tychius picirostris* the longest feint may occur at any place in a succession of feints, but the average duration of the earlier feints is greater than that of those occurring later in the series. Turner had the same results with the ant-lion, and Gee and Lathrop the the Severins, and other workers have also failed to observe any definite relation in the duration of successive feints.

Most insects will feign again and again if stimulated. The number of successive feints is, however, limited. An insect after responding to a larger or smaller number of shocks will finally refuse to respond further. If allowed to rest, however, it will again respond.

In some cases—a well known example is the golden-rod chrysomelid *Trirhabda canadensis*—the insect may feign death on the near approach of the collector; in others the feint is not normally elicited until the insect is touched. Within the same species, however, the intensity of the shock seems to have no effect on the intensity or duration of the feint.

Both the collector and the economic entomologist have taken advantage of the death feint. One of the best known cases in which the economic entomologist enlists the aid of this instinct is the destruction of the plum curculio by jarring the trees. Scott and Fiske in an account of their work on the control of this pest in a Georgia peach and plum orchard give a list of other insects collected by jarring the trees for the curculio. This list includes two hundred and sixty-nine species of Coleoptera representing thirty-one families; seventy-one species of Hemiptera-Heteroptera representing eleven families; and eight species of Homoptera representing three families. Other orders were represented, but the numbers were so few that these insects were not listed.

The advantage of the death feigning instinct to its possessor is doubtful. When an animal resembles its surroundings in colour or form, the ability to remain perfectly still makes it practically

indistinguishable. Every collector or hunter knows the value of immobility in concealment. Certainly every collector has felt the impulse to give voice to some strongly emphatic expletive on losing a coveted specimen which on being approached drew its legs close to its body and dropped to the ground where it remained effectively hidden from his disappointed eyes. We should be careful, however, not to lay too much emphasis on the advantages of this action because it is hardly probable that the natural enemies of these insects are quite as readily outwitted as we are. Indeed the instinct may in some animals be not only useless but positively injurious. This is true of certain birds which, when pursued, instead of seeking safety in flight or shelter, feign death in the open where they may be easily captured.

There have been several explanations given of the nature of the death feint. Certainly there is no consciousness involved, and the instinct is merely a physico-chemical reaction to external stimulus. The most probable theory is that in the death feint we have an example of negative thigmotaxis, that shrinking from contact characteristic of so large a proportion of all classes of animals.

A NEW NORTH AMERICAN SPECIES OF THE GENUS TETRAMERINX (DIPTERA, ANTHOMYIIDÆ).

BY J. R. MALLOCH, URBANA, ILL.

The genus *Tetramerinx* belongs to the subfamily Cœnosiinæ of the Anthomyiidae, and may be distinguished from its allies by the presence of 4 post-sutural dorso-central bristles on the mesonotum. The females are readily distinguished from any allied genus except *Phyllogaster* by the peculiar clawlike processes on the apical abdominal segment.

Stein described the genus under the name *Tetrachæta*, but this name was preoccupied and subsequently was replaced by *Tetramerinx* by Berg.

KEY TO SPECIES.

1. Third antennal joint not over twice as long as
second (Ill.).....*brevicornis*, sp. n.

Third antennal joint at least four times as long as second.....2.

2. Hind femora of male with a comblike fasciculus of short, stiff bristles at base of ventral surface; abdomen in both sexes with a pair of large subtriangular black spots on dorsum of segments 2 to 4; veins 3 and 4 of wings convergent apically; antero-dorsal surface of hind tibia with 1 bristle in female (Cal.).....*femorata* Malloch

Hind femora of male without a fasciculus at base; abdomen in both sexes with a faint central line; veins 3 and 4 of wings subparallel; antero-dorsal surface of hind tibia with 3-4 bristles (Mass., Tex.).....*unica* Stein

***Tetramerinx brevicornis*, sp. n.**

Female.—Length 4 mm. Black, densely covered with yellowish gray pruinescence. Frons yellowish gray with the exception of an opaque, black, wedge-shaped mark on each side at apex of frontal triangle; antennæ and palpi black. Thorax unmarked. Abdomen with very faint indications of a pair of spots on dorsum of segments 2 and 3. Legs black. Calypterae white, yellowish on margins. Halteres yellow. Wings clear, veins yellowish.

Frontal triangle very broad, obscuring central stripe on posterior half; each orbit as broad as central stripe, the bristles nearer inner than outer margin, a series of short setulae laterad of the bristles; frons and face distinctly protuberant; third antennal joint about twice as long as second; arista swollen on basal fourth, very shortly pubescent; marginal bristles on cheek sparse; cheek one-fifth as high as eye, the latter nearly twice as high as long. Thorax very sparsely haired; acrostichals irregularly 2-rowed. Abdomen without strong bristles except at apex. Fore tibia with or without a weak bristle; mid tibia with 2 weak posterior bristles; hind tibia with 4-5 antero-dorsal and 2 antero-ventral weak bristles. Inner cross-vein distinctly beyond middle of discal cell; outer cross-vein almost straight; veins 3 and 4 subparallel apically.

Type locality, Waukegan, Ill., August 23, 1906. Taken on shore of Lake Michigan. Two specimens.

Type in collection of Illinois State Laboratory of Natural History.

THE ANTHOMYIID GENUS PHYLLOGASTER (DIPTERA).

BY J. R. MALLOCH, URBANA, ILL.

In the collection of the Illinois State Laboratory of Natural History I find two species of the genus *Phyllogaster*, one being the genotype and the other an undescribed species.

Nothing is known of the immature stages of the genus. The specimens before me were taken on or near the seashore or the banks of rivers. The genotype was described from specimens from Florida and Massachusetts.

The females of this genus may be separated from those of any other in Cœnosiinæ except *Tetramerinx* by the presence of four strong, clawlike thorns at apex of last abdominal segment. The former has but 3 pairs of post-sutural, dorso-central bristles while the latter has 4. Both sexes of *Phyllogaster* have the frons protruded beyond the anterior margin of eyes, the antennæ much elongated, and the arista bare and much swollen on the basal third.

DIAGNOSIS OF SPECIES.

Abdomen with an interrupted longitudinal median brown stripe and a pair of faint spots of same colour on segments 3 and 4; hind femora with 1 or 2 strong and several weak bristles on apical half of antero-ventral surface; hind tibiæ with 1 antero-ventral bristle; third vein of wing bare proximad of the inner cross-vein.*cordyluroides*.

Abdomen usually with the central stripe faintly visible, the spots indistinguishable; hind femora with from 3 to 5 strong bristles on apical half of antero-ventral surface; hind tibiæ with 2 antero-ventral bristles; third vein usually with a few weak bristles proximad of the inner cross-vein.*littoralis*.

***Phyllogaster cordyluroides* Stein.**

Berl. Ent. Zeitschr., 1897, p. 256.

I have before me two males which I consider belong to Stein's species. One specimen, from Florida, is very pale in colour, being

densely covered with whitish gray pruinescence. The abdominal markings are distinct though not so well defined as in the other example, from Padre Island, Texas, which is considerably darker and has the markings very conspicuous. The Florida specimen is not in very good condition, but the Texas one has the lateral plates of the apical, furcate ventral segment armed with numerous hairs amongst which there are several long bristles. The arista in both specimens is subequal in length to the third antennal joint. Length 3-4 mm.

***Phyllogaster littoralis*, sp. nov.**

Male and female.—Black, densely covered with whitish-gray pruinescence, which is slightly yellowish on dorsum of head and thorax. Antennae and palpi black. Abdomen with very faintly indicated central dark stripe. Legs black, apices of femora and all of tibiae reddish yellow. Wings clear, veins pale. Halteres yellow.

Orbital bristles moderately strong, 4-7 in number; arista pubescent, basal third much swollen, entire length about $1\frac{1}{3}$ that of third antennal joint; cheek from one-fourth to one-third the height of eye. Thorax with few setulae; acrostichals irregularly 2-rowed. Abdomen with setulose hairs, third and fourth segments with a transverse series of bristles on middle which is stronger than the one at apex. Fore tibiae without median bristle; mid tibiae with 2 on posterior surface; hind tibiae with 2-3 antero-dorsal, 2 antero-ventral, and 1 postero-dorsal. Third vein usually with a few weak, widely-placed bristles on under surface proximad of the inner cross-vein.

Length 3.5-5 mm.

Type locality, Grand Tower, Ill., July 12, 1909, on willow on bank of Mississippi River. Paratypes, Waukegan, Ill., August 23, 1906, on shore of Lake Michigan; Algonquin, Ill., July 10, 1895; South Haven, Michigan; July 14, 1914, on shore of Lake Michigan.

A NEW SPECIES OF SOMATOCHLORA (ODONATA) WITH NOTES ON THE *CINGULATA* GROUP.

BY CLARENCE HAMILTON KENNEDY,
CORNELL UNIVERSITY, ITHACA, N.Y.

While gathering material during the past year for a list of western dragonflies, the writer has had the privilege of examining these insects in nearly all the large collections of the United States. Particular attention was paid to the genus *Somatochlora* because of the meagre data heretofore published on these rare insects. Much difficulty was experienced in finding enough material in any one collection to make adequate comparisons of related species.

The writer wishes to thank Dr. Holland and Mr. Hugo Kahl, of the Carnegie Museum, for the privilege of using the specimen in the Carnegie Museum collection as a type.

Dr. Walker has promised to monograph this genus. It certainly needs thorough overhauling by someone who can assemble all the material for careful comparison. The identity of many of the females is a matter of conjecture.

Somatochlora walkeri n. sp.

Holotype.—Male, collected on the Kuskokwin River, Alaska, by A. Stecker, and now in the Carnegie Museum of Pittsburgh, Pa.

Allotype.—Female, a broken specimen in the collection of the Museum of Comparative Zoology. It is a part of the Hagen collection and is labeled "Epith. septentrionalis ♀ Hag. Saskat. Scudder, F. C. Gray's Fund." Segments 4 and 5 are missing, which give it the small size of *septentrionalis*.

Near *hudsonica*, but colour very dark and appendages different. More remotely related to *septentrionalis*, *albicincta* and *cingulata*.

Length of abdomen, male (exclusive of appendages) 32 mm., length of appendages 3 m.; female with abdominal segments 4 and 5 missing, but the abdomen without appendages is probably about 34 mm. Length of hind wing, male, 33; female 29 mm.

Male.—Colour: labium yellow, labrum black, anteclypeus creamy, postclypeus black. Frons black with metallic greenish

reflections, a brownish creamy spot on each side. Vertex and occiput almost black, rear of head black. See Pl. XIII, fig. 9.

Prothorax hidden by the heavy, white pile on the rear of the head and on the mesothorax.

Mesothorax and metathorax metallic green with coppery reflections on the lower end of the mesepisternum and the infraepisterna. Coxæ and all legs black. A suggestion of creamy along the alar edge of the mesepisternum. An obscure, narrowly elliptical, yellow spot on the posterior edge of the mesepimeron above the metathoracic spiracle. Entire thorax covered with long, creamy pile. Wings hyaline. Pterostigmata pale brown.

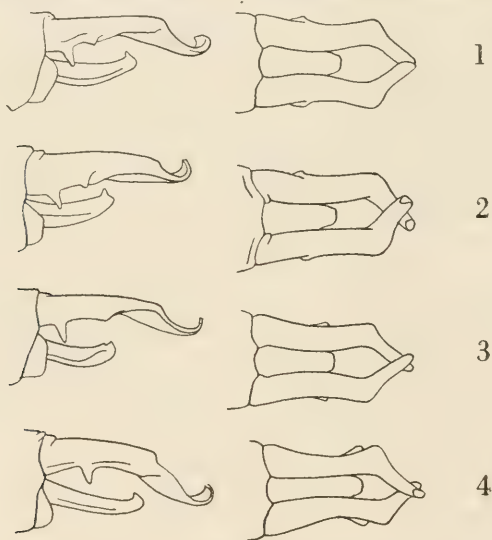


Fig. 10.—*Somatochlora septentrionalis*.

1. Appendages of male, Somer (Coll.), Labrador, M. C. Z.
2. Appendages of male, Grand Lake, Nfd., Williamson.
3. Appendages of male, Winthern (Coll.), Labrador, M.C.Z.
4. Appendages of male, Hudson's Bay, Carnegie Mus.

Abdomen with segments 1-3 and 10 black with metallic green reflections, segments 4-9 pure black except the intersegmental membranes 2-3 and 9-10, and the triangular yellow spot on the lower anterior edge of segment 3.

Structure.—This is a short, heavy species. Occiput large, reaching half way to the vertex. Lateral keel on segments 4-8.

Genital lobes small. Appendages 2-2½ times as long as segment 10. See Pl. XIII, figs. 10, 11. Viewed from above, cylindrical, arching slightly entad, the flat tips, which are half the length of the cylindrical bases, bent sharply entad at almost 90 degrees, then curving caudad with their apices bent dorsad and cephalad. Viewed laterally the externo-inferior surface of the appendage is a longitudinal groove whose external edge has a blunt tooth at its extreme base and the inferior or ental edge has a similar basal tooth, *but this just caudad of the tooth on the external edge of the groove*. Viewed laterally the apical third or the flat tip *bends abruptly ventrad*, then curves caudad, dorsad and finally cephalad. Inferior appendage about half the length of the superiors. Viewed ventrally it is triangular with its base more than half as wide as the appendage is long.

Female.—Colour as in the male but the prothorax with the posterior lobe yellow. Anterior coxa yellow on the outer or posterior side. Femora of anterior and middle legs brown on their basal two-thirds. Front wings with a tinge of dusky in the subcostal space to the first cross-vein. Hind wings tinged along the costal edge to beyond the arculus, also the first three basal cells posterior to the median dusky. Pterostigmata brown.

Abdomen with a pale area on the side of segment 1 and three pale areas on the side of segment 2, the dorsal one of the three being circular and twice the diameter of either lower spot. A large, circular, basal spot on the side of segment 3. (Segments 4 and 5 missing.) Obscure, minute, lateral spots on segments 6 and 7. Articulatory membrane between segments 2 and 3 white, between segments 7-8, 8-9 and 9-10 pale.

Vulvar lamina scoop-shaped, reaching to the middle of segment 10. It is more heavily chitinized than in the type female of *hudsonica*. The sternum of segment 9 reaches barely to the middle of segment 10. Appendages lacking.

This species has been confused with *hudsonica*. Figs. 5-8 are from the types of *hudsonica* in the Mus. of Comp. Zool. Dr. Walker has this true *hudsonica*, collected by Mr. Whitehouse at Red Deer, Alberta.*

*F. C. Whitehouse, Odonata of the Red Deer District. Can. Ent., XLIX, p. 100, Mar., 1917.

De Selys' description (Bull. Acad. Belg. (2) XXI, p. 301) agrees with the M. C. Z. types of *hudsonica*. Martin's figure 28 (Cordulines, Coll. Selys page, 27) is not the true *hudsonica* but this species *walkeri*, which is probably figured from a specimen in the Selys' collection mislabeled *hudsonica*. *Walkeri* differs from *hudsonica* in the superior appendages being closer together; in lateral view, in that the tip is directed ventrad, while in *hudsonica* it is directed caudad. In *walkeri* the two basal teeth almost overlap in lateral view. In *hudsonica*, they are apart the width of either tooth.

In coloration *walkeri* is very dark, but in a large series of *semicircularis* (Kennedy, Proc. U. S. N. M., 46, p. 111,) and in a large series of *albicincta* in the Carnegie Museum there is much variation in colour.

This species has *hudsonica* as its nearest relative. For this reason I have associated with this male the female found in the M. C. Z. collection which is most like the type female of *hudsonica* but seems to be specifically distinct. The female differs from the the *hudsonica* female in darker coloration (as does the male) and in the shorter sternum of segment 9. The only other females with which these might be confused are those of the *forcipata* group, but in none of these does the vulvar lamina exceed segment 9 in length.

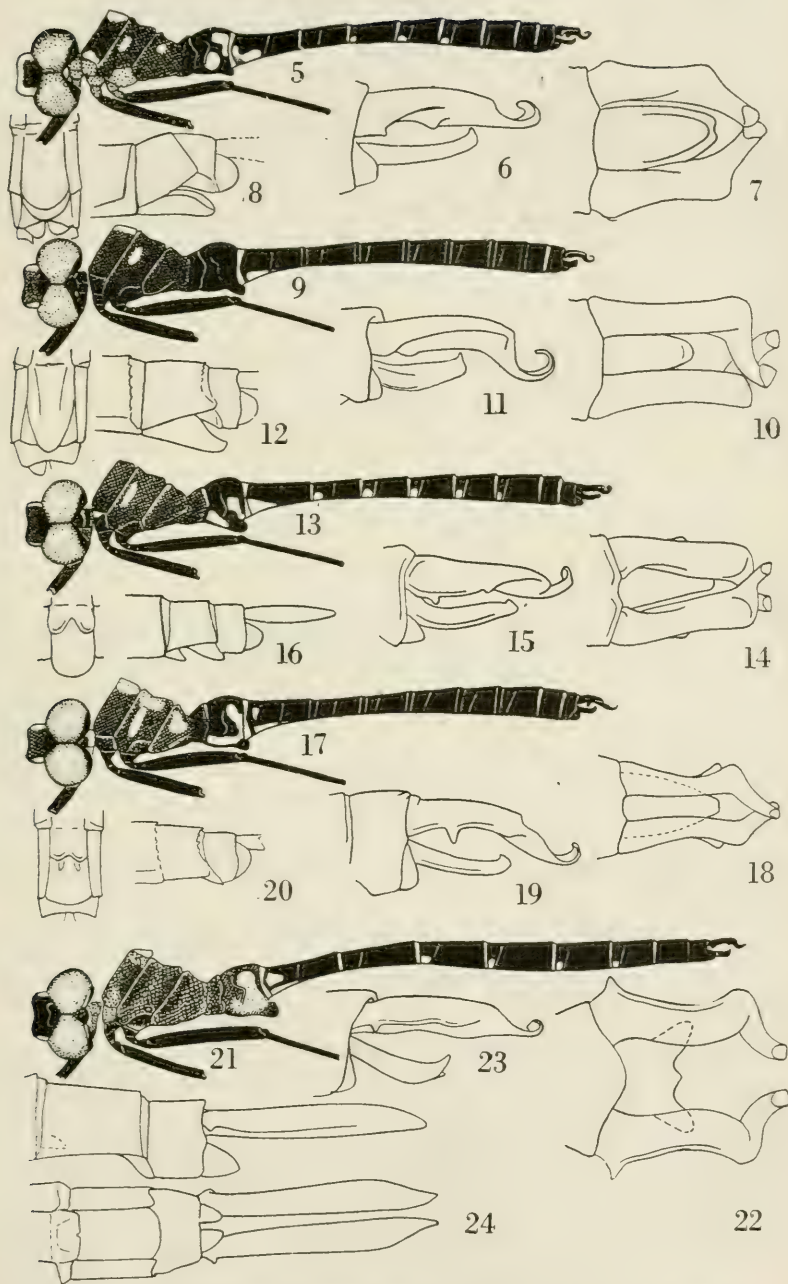
I take pleasure in naming this species for Dr. E. M. Walker, who has done so much work on our northern Odonate fauna.

Somatochlora hudsonica (Hagen).

This species resembles *albicincta*, but is readily distinguished by the greater width between the bases of the superior appendages of the male. Until Mr. Whitehouse took this species at Red Deer, Alberta, last summer, the only specimens in this country were the types in the Museum of Comparative Zoology. The types are 2 ♂'s and ♀, from Ft. Resolution, Hudson Bay Ter., Kennicott, 1861. See figs. 5-8.

Somatochlora albicincta (Burmeister)

Excepting possibly *semicircularis* this is the most common species in collections. The finest series is that in the Carnegie Museum from Mt. Ranier, Washington, collected by Jennings.



The less robust form which Scudder described as *eremita* appears in collections. The types of *eremita* are 3♂'s and ♀, Hermit Lake, New Hampshire, now in the collection of the Boston Society of Natural History. A ♂ and ♀ *eremita* are in Dr. Calvert's collection from the type locality. The writer has a male of this form collected by Dr. Walker at Banff. *Albicincta* and *eremita*

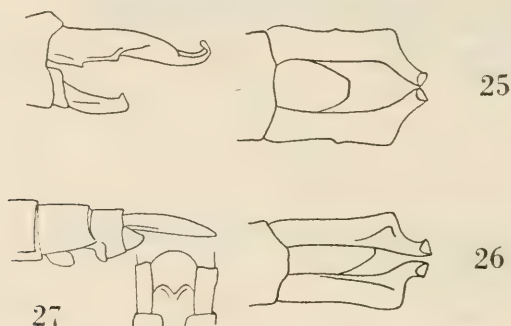


Fig. 11.—*Somatochlora albicincta*.

25. Appendages of male, type of "*eremita*" in Bost. Soc. of Nat. Hist., Hermit Lake, New Hampshire.
 26. Appendages of male in Dr. Calvert's Coll., Hermit Lake, New Hampshire.
 27. Segments 9 and 10 of female in Dr. Calvert's Coll., Hermit Lake, New Hampshire.

undoubtedly intergrade. Figs. 25-27 show specimens from Hermit Lake, fig. 25 being from the type. The male from Banff resembles fig. 26. See also figs. 13-16. The types themselves are nearer to the typical *albicincta* than the Banff or Dr. Calvert's specimens.

***Somatochlora septentrionalis* (Hagen).**

This is the smallest species in the genus, the abdomen being but 31 mm. in length.

A male of this from Hudson's Bay was found in the Carnegie Museum. It was so different from the specimen figured by Williamson (Ent. News, XVII, p. 138, as *hudsonica*) that it was considered new until the two male types in the Museum of Comparative Zoology were examined, when it was found that these type males were intermediate between the Williamson male and this Carnegie Museum male.

Text fig. 10, 1-8 show the variation in the appendages of the four known males of this rare species.

This is evidently a very northern species as the known specimens are from Newfoundland, Labrador and Hudson's Bay. The vulvar lamina of the type female in the M. C. Z. is similar to that of the *albicincta* female but not as deeply notched, being less than a third the length of the lamina. The female can be distinguished by her very small size, for the abdomen of this type is but 30 mm. in length.

The following specimens are in American collections. ♂, Grand Lake, Newfoundland; ♀, Bay of Islands, Newfoundland, in collection of Williamson; ♂, Stag Island, Rupert Bay, Hudson's Bay, in Carnegie Museum; ♂, type, Labrador; ♂, Labrador; ♀, type, Labrador, in the Museum of Comparative Zoology. See also figs. 17-20.

***Somatochlora cingulata* (Selys).**

This is the largest and finest of all the American *Somatochlores*. It is interesting in that in her great robustness the female develops tubercles at the base of her appendages similar in position to those on the male. What is probably a similar assumption of male characters by robust females occurs in another species of *Somatochlora* not in this *cingulata* group. In a letter to Dr. Walker I suggested it might be due to a great abundance of food, while Dr. Walker had data that would indicate it to be due to climatic differences.

Besides a male, and I think a female, in the M. C. Z. collection, whose labels I neglected to copy, the following specimens occur in the collections I have had the privilege of studying. ♂, Bay of Islands, Newfoundland, and ♀, Grand Lake, Newfoundland, in Mr. Williamson's collection. ♂ and ♀, St. Ignace Isl., Lake Superior, and a ♀, from Orient Bay, Lake Nipigon, Ontario, in the Carnegie Museum. See figs. 21-24.

EXPLANATION OF PLATE XIII.

Figs. 5-8. *Somatochlora hudsonica*, male and female types, M. C. Z. Ft. Resolution, Mackenzie, Kennicott, 1861.

Figs. 9-12. *Somatochlora walkeri*, male type, Carnegie Mus., Kuskokwin Riv., Alaska; female type, Saskat., in M. C. Z.

Figs. 13-16. *Somatochlora albicincta*, male and female, coll. Williamson; male, Bay of Islands, Nfd.; female, Kadiak Isl., Alaska.

Figs. 17-20. *Somatochlora septentrionalis*, male, Carnegie Mus., Stag Isl., Rupert Bay (Hudson's Bay); female type, Winthem (Coll.), Labrador, in M. C. Z.

Figs. 21-24. *Somatochlora cingulata*, male and female, Carnegie Mus., St. Ignace Isl., Lake Superior. In copula.

ON SOME NEW OR NOTEWORTHY COLEOPTERA FROM THE WEST COAST OF FLORIDA.—II.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

During the winter and early spring months of 1916-'17 a number of interesting species of Coleoptera were taken in the vicinity of Dunedin, Florida, some of them on Hog Island, others about the lakes and hammocks north and east of the town. Some of these species are evidently undescribed; others are worthy of note on account of their having been hitherto taken at only one or two localities in Florida. Among the undescribed forms taken during the winter is a Staphylinid secured while on a visit to Gainesville. While not found near the coast it is included among the others noted in this second paper bearing the above title.

Biocrypta magnolia, sp. nov.

Elongate, subfusiform, feebly convex. Dark reddish or chestnut-brown, the antennæ and legs paler. Head subquadrate, as wide as elytra, strongly narrowed in front of eyes, vertex coarsely and sparsely punctate; basal joint of antennæ as long as the next four united, third slightly longer than second, which is equal to fourth. Thorax one-third longer than wide, apex as wide as base, sides almost parallel, angles rounded; disc highly polished and with an irregular row of rather coarse punctures each side of middle, and numerous scattered ones between these and the margins. Elytra as long as and slightly wider than thorax, about one-fourth longer than wide, sides parallel, disc coarsely, closely, shallowly and somewhat rugosely punctate. Abdomen but slightly

narrower than elytra, minutely and sparsely punctate, its surface as well as that of head and elytra sparsely clothed with very fine, prostrate hairs; under surface finely and sparsely punctate, the punctures bearing coarse, semi-erect hairs. Male with sixth or last ventral deeply and acutely notched, the third more or less prolonged backward in a lobe. Female with sixth ventral unmodified, the third with an obtuse perforated tubercle near its front margin. Length 7-7.5 mm.

Described from six males and one female taken February 7 beneath the loose bark of a large magnolia log on the grounds of the State University at Gainesville, Fla. Three of the males have the lobe of third ventral but feebly developed, while in the others it is prolonged backward beyond the middle of fifth segment. The genus *Biocrypta*, founded by Casey* upon LeConte's *Cryptobium prospiciens*, differs from its nearest allies in the absence of a pleural fold near the side margin of elytra, in the head being distinctly narrowed in front and by the males having the sixth ventral notched at apex, the third at the same time being lobed as described above. *B. prospiciens* Lec., which occurs in Texas and Arizona, is the only other known North American species of the genus. From it *B. magnolia* differs in colour and in its wider head and smaller eyes, as well as in the different form and coarser sculpture of its thorax.

Medonella minuta Casey.

Three specimens of this pretty little Pæderid were taken December 22 from beneath logs and chunks partly buried in the sand, just above the reach of high tide along the beach of the bay at Dunedin. It was described from Biscayne Bay, and is not recorded elsewhere.

Zagloba bicolor Casey

A dozen specimens of this bristly little Coccinellid were swept January 29, from the low sea-blite, *Batis maritima* L., which grows in partially overflowed tracts on Hog Island, opposite Dunedin. The beetle was described from Palm Beach, Fla., in 1899,** and has not since been recorded.

*Trans. Acad. Sci. St. Louis, XV, 1905, 23.

**Journ. N. Y. Entom. Soc., VII, 114.

***Ischyrys tripunctatus*, sp. nov.**

Form and size of the well-known *I. 4-punctatus* Oliv., from which it differs in sculpture and colour as follows: Head much more coarsely punctate and with a reddish-yellow spot each side between the eyes; thorax less coarsely punctate than head, but more so than in *4-punctatus* and with three instead of four round, black spots, the median one twice the size of the lateral ones, the latter more distant from the margin than in *4-punctatus*. Elytra more distinctly alutaceous and with fine, scattered punctures along the intervals; the common scutellar black spot larger and more evenly quadrate, separated by a narrow, yellow cross-bar from a black space which extends three-fourths to apex and which is partially broken by a yellow line extending backward to apical third along the fifth interval; apex yellow, the oblong, black, sub-apical spots of *4-punctatus* lacking. Length 7 mm.

Described from a single specimen taken near Dunedin, February 8, from between the leaves of a large air plant, *Tillandsia utriculata* L.

***Soronia brunnescens*, sp. nov.**

Elongate-oval, feebly convex. Uniform pale reddish-brown, the legs but slightly paler. Head finely and sparsely punctate, broadly impressed between the eyes, which are prominent and coarsely granulated; antennal grooves almost straight. Thorax two-thirds wider than long, apex broadly and shallowly emarginate; sides broadly and regularly curved, the hind angles obtuse; disc very finely, sparsely and evenly punctate, the margins moderately explanate and feebly recurved. Elytra slightly wider at base than thorax at middle, their margins more widely explanate, sides broadly curved from base to the rounded apex; disc glabrous, without trace of costæ, punctate like the thorax. Abdomen minutely pubescent, finely and densely punctate. Length 3.5 mm.

Described from three specimens taken at porch light at Dunedin, June 10. From the other members of the genus, which are easily known by the presence of a frontal lobe which projects over the basal joints of the antennæ, *brunnescens* is distinguished by its uniform pale colour, smaller size and lack of elytral costæ.

***Arhipis lanieri* Guer.**

A single dead specimen of this rare Elaterid was taken in a fungus beneath the bark of a dead water-oak on December 1st. Its first and probably the only other record from the United States was by Schwarz*, who found a large colony of the adults in the branch of an undetermined tree at Cocanut Grove, Florida. He has also beaten it from branches at Cayamas, Cuba.

***Chrysobothris chrysoela* Ill.**

This very handsome little Buprestid is mentioned by Schwarz as being "very rare" at Haulover, Enterprise and Lake Ashby, Fla. A half dozen or more specimens have been taken near Dunedin by beating the wax myrtle, *Myrica cerifera* L., in November and March. It has also been taken by me at Ft. Myers, Sanibel Island and Lake Istokpoga, and is probably more widely distributed than the records would indicate.

***Melanophila notata* Lap. & Gor.**

Single examples of this rather rare species were taken at Dunedin and Ormond on June 5 and April 6, on the former date at light. It is recorded from Georgia and Florida, and a specimen was taken in an Indianapolis street car on June 22—perhaps an involuntary import by some passenger.

***Hypotrachia spissipes* Lec.**

A single example at porch light on June 5. This species was described from Florida by LeConte in 1862,** but I can find no further mention of it in any Florida list, Schwarz giving only the name as recorded from Florida, but the species not collected by him.

***Polyphylla gracilis* Horn.**

Three specimens have been beaten from young pine trees near Dunedin, between March 27 and April 10. It was described from "near Jacksonville, Fla."

***Chlorophorus annularis* Fab.**

A single example of this East Indian species, known hitherto from India, Java, Borneo and Sumatra, was taken at porch light at my residence in Dunedin by my son on June 10, 1915. It was determined for me by A. J. Mutchler of the American Museum of Natural History, and was shown by him at the meeting of the New York Entomological Society on November 21, 1916.

*Proc. Ent. Soc. Wash., Vol. 2, p. 39.

**Smithsonian Misc. Coll., III, 137.

***Neoclytus simplarius*, sp. nov.**

Elongate, slender, subcylindrical. Pale reddish brown. the apical third or more of elytra fuscous-brown; elytra each with a narrow, oblique bar of white pubescence at basal fourth, and a similar but wider bar of longer white hairs at apical third, both of these bars extending over to the sides of the under surface. Head coarsely, densely, rugosely punctate. Thorax subcylindrical, nearly twice as long as wide, its sides just visibly curved from apex to basal third, then suddenly strongly narrowed into the neck-like base; disc rather finely, very densely rugosely punctate, the median line with five very small, transverse tubercles. Elytra at base slightly wider than middle of thorax, then feebly narrowed and subparallel almost to apex, the tips separately obtusely angulate; disc minutely, evenly and very densely granulate-punctate, the granules covered with a very fine, velvety pubescence. Middle and hind femora armed at apex with two minute flat spurs. Length 4-8 mm.

Described from two specimens, beaten from *Ampelopsis arborea* L. at Dunedin, March 29—April 3, and two cotypes in the collection of Chas. W. Leng, taken at Enterprise, Florida, on November 10, from *Quercus nigra*. The transverse ridges or tubercles of the median line of thorax in the Dunedin types are so small as to be easily overlooked, and the species, therefore, taken for a *Clytanthus*, but in one of the Enterprise specimens they are larger and there are two additional tubercles on each side. The species resembles *Clytanthus albofasciatus* Lap. closely in form, size and general colour, but differs widely in the shape and sculpture of thorax and in the arrangement of the pubescent pale bars of elytra.

(To be continued.)

THE INSECT COLLECTIONS OF CANADA.

COLLECTION OF MACRO-LEPIDOPTERA, OWNED BY
F. H. WOLLEY DOD, MIDNAPORE, ALTA.

BY F. H. WOLLEY DOD.

The collection consists of about twenty-five to thirty thousand specimens. Of these, about three or four thousand are British, with a few other European and some Asiatic examples. These, with

very few exceptions, are kept together in one cabinet. The bulk of the British collection was formed during the owner's schoolboy days, over twenty years ago. Special attention has always been given to the Lepidoptera of Alberta, and allied species have been acquired from time to time from other parts of the continent in order to get a better understanding of local forms. But a chief specialty has now long been made of the Noctuidæ of North America, which comprise by far the greater portion of the collection. Very many of these have been obtained by purchase or exchange.

The room in which the collection is kept is comparatively large and very well lighted. The presence of a good light is most desirable for making critical studies, the absence of it giving rise to false conceptions. The collection itself is contained partly in cabinets, and partly in wooden store boxes. The drawers of the largest cabinets measure about eighteen inches wide, and about twenty-four from front to back. Such a large size has many advantages, especially for long series, but has been found rather unwieldy and awkward in practice. About seventeen or eighteen inches square seems more generally serviceable. About half the boxes are twelve inches by twenty, and double-sided; that is, each box contains usable space of twenty-three by nearly nineteen inches. These have considerable advantages over large cabinet drawers by reason of their lightness, though flat drawers, if not too heavy are actually safer. The smallest boxes are ten inches square and single-sided.

The paper, or occasionally the bare cork, as well as the sides of the cases, are first covered with a paint consisting of oxide of zinc and gelatine, applied hot. This, besides being an excellent way of renovating a stained or dirty box, increases the whiteness of even the best new paper, and greatly improves the light.

The greater part of the Noctuidæ were recently re-arranged. Sir George Hampson's generic names being used, with occasional slight alterations in the sequence for greater convenience and economy of box room. But the order of species in many of the genera is more in accordance with the owner's own conception of relationship. Hampson's specific names have also been used, with certain changes deemed necessary. The specimens are in double rows, males being placed on the left of a column, and females on

the right, whenever the sexes are fairly well divided or where economy of space is not important. But when one sex largely predominates, especially in long series, or where space is scarce, supers of the long sex are pinned to the inside of the centre of the wrong row. For instance, in a series of twenty-five males and six females, about five of the males might be pinned just sufficiently to the left of the centre of the female row to attract attention to the fact that they were not females. This still leaves room for the subsequent insertion of a few of either sex without lengthening the column. It has been usual to arrange a species in groups by localities, the sex arrangement being adhered to. In the case of a long series from one locality, some scheme of more or less continuous variation is often followed, say from light to dark, those of opposite sexes which most closely resemble one another being kept side by side. It may be observed that such an arrangement leaves frequent blanks in one or other of the rows, giving a very asymmetrical appearance, and in fact is not a paragon of neatness. But the collection is intended essentially for study, and though neatness is aimed at in most departures, utility and instructiveness are primarily considered. Some of the smallest species are arranged three or four rows in a column instead of two. In some of the cabinets the columns are divided by narrow strips of red paper pinned on, but others, and all the boxes, are merely ruled in ordinary lead pencil. Throughout the Noctuidæ spaces have been left for all known species, and every space has a name label. The size of the spaces varies according to the probability of acquisition in the near future, and also, unfortunately, in some genera especially, to the space available, and the length of the series already possessed. The size of spaces left for extension of series is regulated for the most part by the degree of variation. Though some cases have far more blanks than specimens, as a matter of fact the collection as a whole is much more crowded than was at first intended, and there is occasionally little or no room for extension. The columns also are too close together. All cases are, of course, kept well supplied with naphthaline.

As very close attention is paid to variation, long series of the more variable species are kept, there being in one or two instances as many as two hundred and fifty, and that number is considered far

from adequate. The species name is placed at the bottom of each column as well as at the end of the series or of the space left for extension. Each label has the name in brackets except the last of these. Reference has sometimes to be given to a continuation of a series in some extra box not in the sequence. Series consist of specimens picked to show the variation as much as possible. It has always been the custom, at the end of a season's collecting, to carefully examine all the new material in each species taken, and to pick out examples showing modifications not yet in the series, and relax, set and install them. Owing to lack of time in the summer very few things are set fresh. Unfortunately there are as yet very few early stages represented. Each drawer or box has an outside label on the front, on which they are numbered consecutively, with the names of all the genera contained therein, and when a genus is not all in one case, with some indication of the included species or group. Extreme accuracy of data is attempted.

The locality of personally or locally collected specimens is, as a rule, indicated by means of two labels on the transfixing pin. The uppermost of these gives the general locality and province, exact date when possible, and collector's name, though it has been a general custom to put the owner's name to all material collected by one or two constant assistants in the immediate district. This practice was to save extra trouble, but is not strictly in accordance with principles. A smaller label beneath this gives the more exact locality. Method of capture is occasionally indicated. Bred specimens are so marked, with "ex larva" or other stage, and food plant. Pairs taken *in copula* bear identifying labels. Specimens acquired from outside sources were formerly marked with collector's name and from whom received, and date of receipt. Latterly all such material has been given a small label bearing the year of acquisition, and a number, corresponding to similar numbers in an "Acquisition" book, in which full details of the receipt are noted. For instance, "13-16" on a small, separate label beneath the locality label refers to a note in the book under the year 1913, and Acquisition No. 16. This note gives details of the transaction, whether purchased, exchanged, donated, etc., date of receipt, number and class of specimens,

from whom received, general condition, and other details worth recording. The first lot received in the following year bear reference label "14-1." This system is in use in many museums, notably at Washington and in British Museum, and has many advantages to commend it.

The collection contains very few actual types, probably not more than a dozen, and fewer than a hundred co-types. But the next in value to types, and frequently, be it said, of far greater value than co-types, are specimens personally compared with types, co-types, with other important specimens, and with figures and descriptions. These specimens all bear extra explanatory labels, such as "Xd male type* at Rutger's College," with brief indication as to its concise points of difference, or "=beta female type at Brooklyn, exactly," or "*Alpha delta*, agrees with fig. of type," etc., etc. Specimens submitted to experts are similarly labeled, (in red ink) with reference to filed correspondence in corroboration. Specimens of which figures have been published are also marked. Some specimens have been compared with two or more types, and synonymic references thereby made or confirmed.

In addition to the above "authenticity" pin-labels, small card labels are placed at the side of these specimens so that they may be found quickly. These are more brief, and the most important ones are on tinted card, to catch the eye. For instance, a small, red-tinted label beside a specimen in the series of *Euxoa catenula* Grt., "Xd type, and *contagionis* Smith Xd type," would indicate the one by comparison of which with both types the reference of *contagionis* to *catenula* had been made. Varieties are not often separated or indicated as such, but merely by a similar side label bearing the name under which the form was described, whether actually compared or not; e. g., under *Monima hibisci* (*Taniocampa alia* of our lists) would be a large species name-label, "*hibisci* Gn.," at the foot of each column, and each one bracketed except the last. At the side of one specimen might be a small label "*quinquefasciata* Sm.," which is considered a variation. In this particular case an "Xd type" or "Xd description" specimen is probably referred to, though a specimen thus indicated

*The author uses a private symbol ♂, enclosed in a circle, to indicate male type, and ♀, enclosed in a circle, for female type.

does not always bear an authenticity label. Against another might be "*latirena* Dod" indicating one of a geographical race, and another "*malora* Smith." The status of such names, and of others, as decided upon by the owner, is explained in note-books and a card index. A brief note is sometimes placed at the bottom of a series, perhaps referring for comparison to some other species and box. Points for future investigation are thus kept in mind.

By no means the least valuable accessory to the collection is a series of MSS books containing critical notes. All those concerning North American species are indexed in a Smith's 1903 Check List, species described since its publication being entered at intervals. That was the system primarily adopted, and still adhered to, though the notes are now also indexed on a card index referred to below. They consist largely of records of impressions gained from inspection and studies of sundry other collections, and include notes on all types seen, as well as details concerning comparisons made with them, and any other facts about collections or specimens examined deemed worthy of note. There are a large number of entries concerning careful comparisons of Hampson's published figures with the types or other specimens from which they were taken, detailing any discrepancies in reproduction. A considerable quantity of discovered synonymy, and corrections of errors in identification by other authors are therein noted, which have not yet been published. Nearly all except the earliest notes bear dates of origin, and the same applies to those on the pin-labels. Needless to say, of several notes taken of the same type on different occasions, where inconsistencies appear, those of the later dates carry most weight, being the result of a closer acquaintance and better knowledge. These MSS books are primarily for the author's own guidance and instruction, and, it must be confessed, are scarcely a model of calligraphy.

Another very useful accessory is a Card Index, containing between four and five thousand cards, dealing almost exclusively with Noctuidæ. A card is allowed for each specific or varietal name ever published of North American species included in Hampson's catalogue from vols. IV to XIII. On the cards are entered:

The name and its author, at the top.

Reference to original description and date.

Reference to the more important publications such as Hampson's and Smith's catalogues, monographs, and to figures, stating in each case the genus to which the name has been variously referred, and dates of the publications.

Important synonymic references.

At the bottom of the card, if the name stands as the prior one for a species, all the later names are given, with authors and dates, numbered in order of priority, those that stand for recognizable variations being so indicated. Or, if a synonym or variety, the first name only of the species is referred to, e. g., "*=alpha* Sm., 1891" or "*=var. of alpha* Sm., 1891," the authority for such references being elsewhere given on the card. Since, as before mentioned, each synonym or variety has a card to itself, a few species have twenty or more cards. A certain European Tortrix would require nearly seventy, allowing only one for each name. When space fails, another card has to be added, and the fact indicated at the top of each. At the top corners of the card are given:

Reference to the page in note-books where the form is dealt with.

Reference to the number of the slide on which genitalia have been mounted.

Reference, when thought desirable, to the drawer or box containing the species in the collection.

On the reverse side of the card is given the sex, locality and present location of each known type and co-type, together with the number, sexes, and localities mentioned in the original description.

A great deal of time has been spent in preparing this index, which has obviated more congenial work, but it has proved to be of the highest value and utility, as entire knowledge of literature and personal study of any name can be discovered in a moment, with little trusted to memory alone.

There is also a full MSS list of the N. American Noctuidæ, in Hampson's order and names, but revised to correspond with the arrangement in the collection. The recent synonymy only is given, original or otherwise, and all names which are considered to refer to recognizable varieties are entered as such. This list is

marked off according to box numbers, so that immediate reference can easily be made directly to any series.

A beginning has been made of the study of genitalia, and about six or eight hundred most excellent mounts have so far been prepared by Mr. W. H. T. Tams. Where material and time have permitted, several mounts of a species have usually been prepared from one locality, and where variation has been noticed or suspected, more have been made from different localities. As many as four are sometimes put upon one slide, and each mount is numbered to correspond with one on the specimen from which it was taken. These bear the usual data, and are carefully preserved, being in many cases installed in the general collection, and their position indicated by a special symbol at the side. The slides are numbered consecutively, and a catalogue is kept of them, in which brief, critical notes are entered. This study entails the sacrifice of the abdomens of the specimens. Poor, if recognizable, specimens have been used by preference, but when such details of comparison were thought to be of extreme value, good specimens have often been used, even of rare species. It is confidently believed that the partial spoiling of a certain number of specimens is a means fully justified by the end in view, which is the ultimate better understanding of a department of entomological study about which, whilst much has been written and suggested, a very great deal yet remains to be discovered. So far as the author has at present investigated, much valuable evidence, sometimes quite unexpected, has been acquired. And though it is by no means proposed to accept all previously published notes and figures made by others on the subject as unimpeachable evidence in favour of claims made therefor, certain facts brought to light speak for themselves in such a way as to remove all doubt which may have existed as to the extreme value of the study, if carefully and intelligently followed, as an aid to the elucidation of various obscure problems of relationship.

Perhaps the most regrettable want in connection with the collection is a good library. This contains very few publications of an earlier date than 1890, and scarcely any European literature, none of the earlier authors.

The author takes great pleasure in naming North American Noctuidæ and preparing critical notes for other students, and exchanging views. The work is found to be self-instructive, as well as useful to others. All material received is studied very closely, and anything doubtful compared with series and notes. The Card Index is resorted to in this connection. Everything is always returned unless special leave is given for retention. There are a large number of duplicates for distribution, consisting for the most part of Noctuidæ, principally unset. All Macro-Lepidoptera from Alberta or vicinity are desirable, and Noctuidæ (only) of N. America or Europe, and some Asiatic. When at home the owner derives great pleasure from showing the collection to any entomological visitors who are genuinely interested.

RECORDS OF EUROPEAN MIRIDÆ OCCURRING IN NORTH AMERICA. (HEMIPTERA, MIRIDÆ).

BY HARRY H. KNIGHT, ITHACA, NEW YORK.*

The writer desires to submit some definite data on the occurrence of certain species of Miridæ common to Europe and now known from North America. There are here recorded three species new to our fauna, and definite records are given of three others which are of particular interest. In conclusion the writer gives his findings on certain species supposed to occur and that apparently do not.

Subfamily PHYLINÆ. Tribe PHYLINI.

Microsynamma bohemani Fallen.

16 ♂ ♀, June 27, 1916, Honeoye Falls, N. Y. (H. H. Knight). ♀, June 22, 1914, Rochester Junction, N. Y.; ♂ 2 ♀'s, June 26, 1915, Honeoye Falls, N. Y. (M. D. Leonard). ♀, July 27, 1913, Callicoon, N. Y. (Wm. T. Davis). ♂, Aug. 9, Spruce Brook, Newfoundland, (Chas. Schaeffer). 7 ♂ ♀, Fort Collins, Colorado, (U. S. National Museum).

This species is apparently well distributed in the Eastern United States, having been reported before, but rather indefinitely. Mr. Van Duzee has failed to recognize it in his recent check-list of the Hemiptera, and previously in his tables to the genera of Miridæ. The writer has compared our specimens of this species

*Contribution from the Department of Entomology of Cornell University.
July, 1917

with European forms of *bohemani* determined by Reuter, and finds them to be identical. At Honeoye Falls, N. Y., the species was found breeding on ornamental willows, growing in a commercial nursery. Doubtless the insect was in this case imported from Europe in the egg stage on the nursery stock. One specimen from Colorado has the hemelytra entirely pale, but the form of the insect is distinctive.

Subfamily ORTHOTYLINÆ. Tribe HALTICINI.

Orthocephalus mutabilis Fallén.

Specimens of this species were taken by Mr. C. W. Woods, July 2, 1913, Orono, Maine. Mr. Woods reports finding the species on wild daisies and only in one field. The writer has compared two male specimens with European representatives of *O. mutabilis* determined by Reuter, and finds them identical in structure of the genital claspers as well as colour. *O. mutabilis* Fallén is easily distinguished from *O. saltator* Hahn by the pale or yellowish inner half of the clavus and the black tibiæ. The writer has not seen a specimen of *saltator* collected from North America. Provancher (1886) records *O. saltator* from Canada, and his description fits that species very well. Mr. Van Duzee (Can. Ent., 44: 322), in reviewing the Provancher collection of Hemiptera, states: "136. *Orthocephalus saltator* Hahn. A Capsid new to me but certainly not the European *saltator* Hahn." If *O. saltator* Hahn has been taken in North America the writer would appreciate having the matter brought to his attention. Mr. Van Duzee in his recent tables to the genera of Miridæ left out the genus *Orthocephalus* for want of material from this continent.

Halticus apterus Linnæus.

The writer has seen only one specimen of this species taken in North America, and that was received from Mr. H. M. Parshley who will shortly publish the record from the New England States. This specimen was compared with European material at the U. S. National Museum and found to be identical.

Halticus citri Ashmead, which is our most common species, has in the past frequently been labeled *apterus*. It appears under

three names in the Uhler collection and in the U. S. National Museum collection. *Halticus apterus* is easily recognized by the large, robust, convex form, the black and very shining dorsum without the golden scale-like pubescence.

Subfamily ORTHOTYLINÆ. Tribe ORTHOTYLINI.

***Cyrtorrhinus caricis* Fallen.**

12 ♂ ♀, Sept. 10-17, Rockaway Beach, Long Island, N.Y. (H. Ruckes). ♂ 2 ♀'s, Sept. 5-10, Sea Cliff, N. Y. (Nathan Banks). ♀, Sept. 30, Lakehurst, New Jersey, (H. G. Barber).

This species adds another to our fauna of those well known in Europe. In the past Uhler had placed his *Orthotylus marginatus* as a *Cyrtorrhinus*, but to date no species from this country has been allowed to remain in that genus. The writer has worked over all the literature on *Cyrtorrhinus caricis* Fallen and finds the material here recorded agrees with that species in every respect. The small size, rounded black head with two pale spots on the vertex, black thorax and scutellum, pale legs, clavus and inner half of the corium fuscous with the embolium and outer half of corium pale greenish, will serve to distinguish the species at once.

Saunders (British Heteroptera, p. 283) records the species from "amongst rushes," and judging from the Long Island locality records the species will probably be found breeding on *Carex* or other plants in the Cyperaceæ.

***Heterotoma merioptera* Scopoli.**

♀, Aug. 5, 1915, Honeoye Falls, New York, (M. D. Leonard). This interesting addition to our fauna was taken by Mr. Leonard on the land of one of the large importing nursery firms situated at Honeoye Falls, N. Y. It has doubtless been introduced in the nursery stock shipments or in the packing that comes around the stock. In this way we have got and will probably continue to import insects that deposit their eggs in the stems of various plants.

Saunders (British Heteroptera, p. 295) gives a good account of the species which is easily recognized by the rugose character of the membrane and the inflated second antennal segment. The writer has compared the above specimen with forms from Spain and England and finds it to be identical.

Subfamily MIRINÆ. Tribe MYRMECORINI.

Pithanus maerkelii Herrick-Schaeffer.

This interesting Mirid was first reported from the United States by Mr. C. E. Olsen (Bull. Brooklyn Ent. Soc., 10 : 34) who took specimens on Long Island, N. Y. A specimen was taken next at White Plains, N. Y., by Mr. Torre Bueno, and during the past year the writer received a specimen from Mr. H. M. Parshley, collected at Eastport, Maine, by Mr. C. W. Johnson.

The writer took ♂, 11 ♀'s, June 27, 1916, at Honeoye Falls, N. Y., and other specimens were taken at the same time by Mr. Wm. T. Davis who was present on the trip. The species was swept from grasses growing along the edge of land set to nursery stock, and thus may have been imported locally at that place. The writer took one female specimen which had fully developed wings, and this form is, according to Saunders (British Heteroptera, p. 219), "very rare."

Species of Doubtful occurrence in North America.

The writer has recently completed a revision of the genus *Lygus*, and during the course of researches on the material from North America came to the conclusion that the records of *Lygus contaminatus* Fallen, *Lygus lucorum* Meyer, and *Lygus viridis* Fallen, have been cited in error. In the case of *Lygus viridis* Reuter (1909), the writer was able to study one of the specimens and finds it to be different from the European *viridis* Fallen: having structural points of difference which will be shown in the forthcoming paper on *Lygus*. The writer has studied European specimens of the above species which were determined by Reuter, and are now to be found in the collection of the U. S. National Museum. The records of *contaminatus* and *lucorum* have doubtless been based on certain colour forms of *Lygus apicalis* which species has a wide distribution in North America.

Neobothynotus modestus Wirtner (Ent. News, 28 : 33, 34).

The writer is unable after a careful study of the literature to find generic points of difference between *Neobothynotus* Wirtner and *Bothynotus* Fieber. Furthermore, the description of *N. modestus* Wirtner does not appear to differ from the description of *Bothynotus pilosus* Boheman, which species is well described by

Reuter (Hemip. Gym. Eur., V, p. 7) and Saunders (British Heteroptera, p. 263). The writer strongly suspects, though regretfully, that the above represents an importation of *Bothynotus pilosus* Boheman on some of the shrubbery in Col. Huff's park.

SOME NEOTROPICAL MEGACHILID BEES.

BY T. D. A. COCKERELL, BOULDER, COLO.

The specimens recorded below are in the U. S. National Museum.

***Anthidium chubuti* Cockerell.**

Both sexes from Chubut, Patagonia (from W. F. H. Rosenberg). There is great variation in size, and the femora may show much or little black. The male, not previously known, differs by having the clypeus and space between clypeus and eyes, and mandibles except apex (which is bidentate) and extreme base pale yellow; vertex with either a complete band or a pair of spots; face with pure white hair; greater part of pleura with pure white hair, but posteriorly it is black; vertex, mesothorax and scutellum (except posteriorly) with fulvous hair; occiput and metathorax with black hair, front with sooty; marks on abdomen variable, the posterior three pairs may be reduced to spots. The large male has a small third tooth on the mandibles. *A. patagonicum* Schrottky, published about a month and a half later, is evidently the same species.

***Anthidium rubripes* Friese.**

Male.—Mendoza, Argentina (C. S. Reed). The hair on head and thorax is white, not "yellowish brown," as Friese describes; but the insect otherwise agrees, and there is no other species from Mendoza like it. The species is closely allied to *A. chubuti*, but narrower and quite distinct. The male mandibles are bidentate at end, and have on inner side a large, black, triangular plate.

***Hypanthidium taboganum*, sp. n.**

♂, (Type). Length 7–8 mm.; black and bright chrome yellow, only the tegulae, knees, scape behind (in front yellow) and base of flagellum red; head and thorax extremely densely punctured, with scanty hair, that on head and thorax above fox-red; yellow markings as follows: mandibles except apex, clypeus, July, 1917.

dog-ear marks, band like lateral face-marks (ending in point at level of middle ocellus), entire occipital band going half-way down cheeks, small spot on tubercles, lateral and anterior margins of mesothorax (except a wide interval on anterior middle), axillæ, broad hind margin of scutellum, anterior and middle tibiæ and basitarsi; in front, elongate basal and transverse apical mark on hind tibiæ, hind basitarsi in front and spot on second tarsal joint, oblique mark at extreme sides of second abdominal segment, and all of the other segments except extreme base and translucent reddish apical margin; mesopleura with large, distinctly separated punctures; wings dilute fuliginous, apicostal region darker; first three abdominal segments finely punctured, the others with large punctures; no lateral spines; seventh segment very broadly rounded, with a median pit. The anterior femora may be red above except at base.

♀.—Similar, but clypeus black, mandibles with only a small, yellow spot, no dog-ear marks, more red hair on scutellum, yellow of legs reduced and more or less reddened, hind tibiæ black except a small basal spot, all the basitarsi black, anterior femora with a yellowish-red band on apical half; yellow bands of abdomen narrower, the fourth notched behind. Ventral scopa shining white.

Hab.—Taboga Island, Panama, June 9 and 11, 1911, (*A. Busck*); also one Feb. 19, 1912, (*A. Busck*). Related to *H. aureo-cinctum* and *H. panamense*, but easily separated by the yellow and black legs and absence of discal stripes on mesothorax. From the descriptions, it seems also to be somewhat allied to the *Anthidium mexicanum* and *A. agnatum* of Cresson; these species have been supposed to belong to *Dianthidium*, but the types should be examined to see if they are possibly *Hypanthidium*.

Hypanthidium melanopterum, sp. n.

♀.—Length about 8 mm.; black and chrome yellow; yellow markings as follows: lateral face-marks (consisting of a large patch on each side of antennæ, sending a narrow stripe upward along orbits), entire occipital band going a little way down cheeks, narrow anterolateral margins of mesothorax, rather narrow band bordering scutellum and axillæ, slightly broken band on first abdominal segment, small mark on each side of second, entire bands on third

to sixth, on sixth covering segment except margin; tegulae bright ferruginous; wings fuliginous; legs black, the anterior femora (except basally) and tibiae red in front; a small, red tubercle below each eye; scape yellow in front, otherwise red with a dusky shade; base of flagellum (and under side more or less) red; ventral scopa glittering white. Mesothorax densely and strongly punctured.

Hab.—Mexico (Baker collection 2154). Easily known from *H. taboganum* by the band on first abdominal segment. It is allied to *H. ecuadorium* (Fries), but easily separated by the shape of lateral face-marks, less projecting and much more narrowly margined scutellum, very coarse punctures of thorax above (especially large on scutellum), entirely black tubercles, etc.

***Stelis veraecrucis*, sp. n.**

♀.—Length about 7 mm.; black, with yellow markings as follows: clypeus except a very large semicircular area above (the yellow area thus like two mountains with a valley between), narrow lateral face-marks extending a little above level of antennae, a small, elongate spot at inner upper side of each antennal socket, a very narrow, occipital band, scutellum and axillae except anterior border, (no other yellow on thorax), and entire bands on abdominal segments 3 to 6; legs very dark reddish-brown, without markings; tegulae black; wings fuliginous, the costal region darkest, second recurrent nervure going far beyond end of second submarginal cell; abdomen partly obscure reddish beneath at base; venter with short, white hair. Antennae black, with red spot at apex of scape, and third joint red beneath; head and thorax above with excessively large, crowded punctures, on mesothorax so large that a line from anterior to posterior end traverses only about a dozen; scutellum prominent; base of metathorax with a transverse band of large pits.

Hab.—Medellin, Vera Cruz, Mexico (*H. H. Hyde*; Baker coll. 1785). For the interpretation of this Baker number see Ann. Mag. Nat. Hist., Feb. 1905, p. 201. Nearest to *S. laticincta* Cress., but very distinct by the large punctures of thorax, first two abdominal segments all black, etc. The insect has a close superficial resemblance to the two species of *Hypanthidium* described above.

BOOK NOTICE.

A Year of Costa Rican Natural History, by Amelia Smith Calvert, Sometime Fellow in Biology, Bryn Mawr College, and Philip Powell Calvert, Professor of Zoölogy, University of Pennsylvania. The Macmillan Co., New York; The Macmillan Co. of Canada, Toronto Feb, 1917. xix+577 pp., with maps and numerous illustrations from photographs, including coloured frontispiece. Price \$3.00.

The single year (May 1, 1909 to May 10, 1910) spent by Professor and Mrs. Calvert in Costa Rica was a full one indeed, to judge by this interesting chronicle of their experiences in that remarkable land. To have gathered, in a single year, the vast quantity of information contained within its pages must have demanded great concentration of effort, both mental and physical. This information concerns not only the animals and plants of the country, in which the authors were chiefly interested, but also the climate and topography, the life and customs of the people, conditions and methods of travel, and many other matters of interest to the visitor.

As the main object of the trip was the study of the dragonflies of the country, the references to these insects are proportionately numerous, and among the more interesting discoveries in this field were the finding and rearing of the larvæ of *Mecistogaster modestus*, which breeds in the water between the leaves of epiphytic bromeliads (plants belonging to the Bromeliaceæ or Pine-apple family), the larva of *Cora*, which possesses lateral abdominal gills, recalling those of the mayflies and Sialids; and the habits of certain waterfall dwellers belonging to the genera *Thaumatoneura* and *Argia*. These have already been described at length by Dr. Calvert in a series of papers published in the Entomological News.

A great many other matters of interest to entomologists were brought to light, not only concerning dragonflies but numerous other groups of insects, e. g., observations on the swarming and migratory flights of butterflies and day-flying moths, the habits of leaf-cutting ants and the curious relationship between the ants found upon the Bull's Horn Thorn and their host tree, interesting cases of apparent mimicry and protective coloration, curious and striking insects of various kinds, such as the huge horn-bearing Scarabæidæ, (*Dynastes*, *Megaceros*, etc.), strange lepidopterous

larvæ, particularly the weird caterpillars of some of the Megalopygid moths; and hosts of other observations of interest to students in all branches of entomology.

Much is also told of the birds, reptiles, mammals and other animals observed, while the descriptive notes on the plants, illustrated by numerous photographs, will not only be of interest to botanists, but will be of much value in giving to the general reader a mental picture of the types of vegetation, characteristic of tropical America.

Among the most interesting chapters is the one describing the ascent of the volcano Irazu, which gives a detailed account of the volcano itself with its various craters and many notes on the plants and animals observed there; and the final chapter, dealing with the destruction of Cartago by earthquakes in the spring of 1910, just at the close of the authors' year in Costa Rica. Cartago was chosen as their headquarters, from which excursions to various parts of the country were made, the materials collected being always brought here and kept in a room in the hotel, which served as a laboratory. One of the early chapters (chap. 4) is devoted to a description of the town and its life, as it existed before the earthquake, while the last chapter, "*Carthago deleta est*," gives a vivid and detailed picture of this terrible event, in which the entire town was wrecked and nearly 300 people were killed, the authors themselves suffering a very narrow escape. Fortunately, although the living larvæ, which represented the rearings of many months, were nearly all killed, the preserved specimens, notes, journals and photographs were uninjured.

The book is remarkable for the extreme care and accuracy which characterize both matter and typography. The authors have not been content merely to state their own experiences, but have acquainted themselves with a large body of literature treating of the various subjects upon which they have written. One of the most useful features of the book is the copious bibliography contained in Appendices III and IV, the former giving a list of "papers based in whole or in part on the collections made by the authors in Costa Rica," the latter "a list of selected literature relating chiefly to the Natural History of Costa Rica, exclusive of that cited in Appendix III."

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POPULAR AND PRACTICAL ENTOMOLOGY.

THE STRAWBERRY ROOT WEEVIL IN BRITISH COLUMBIA.

BY R. C. TREHERNE, ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

Since issuing Bulletin No. 8, of the Dominion Entomological Branch, on the Strawberry Root Weevil (*Otiorhynchus ovatus*) in British Columbia, certain studies have been undertaken which may well be recorded at the present time.

This weevil still maintains its high degree of importance in the strawberry plantations of the Province. It has gained access to the fine strawberry plantations of the Saanich Peninsula, near Victoria, to a degree which is causing considerable apprehension among the growers.

While primarily an insect adapted to the moist, cooler areas adjacent to the Pacific Ocean, it has been reported as causing considerable damage to plantations in the arid transitional areas of the interior. During the past two years reports of this nature have been received from northern points in the Okanagan Valley, and more recently it was observed in considerable quantity at Grand Forks. Many enquiries further have been received from the Lower Kootenay country, particularly Kaslo, Nelson and Boswell. It has not, as yet, been reported from the Creston district, but there is no doubt that its presence will be felt in this latter section at no distant date, even supposing it does not occur there at present.

It has been claimed that this insect is an introduced species from Europe. I find this very hard to believe, and I would be very much interested to find out on what grounds this statement is advanced. I have taken it at various altitudes up to 4,000 feet in the mountains, far removed from any cultivated land, and I have seen it on isolated, rocky islands of the Pacific Coast of British Columbia. In one instance, I remember finding it on a rocky

island, almost devoid of grassy vegetation and supporting only a stunted growth of fir trees. Considering the fact that this island was several hundred yards from the coast line and at all tides entirely surrounded by salt water, combined with the fact that the weevil is unable to fly, it becomes increasingly hard to believe that this insect is other than an indigenous species.

All evidence points to this weevil being primarily a grass-infesting insect, and further that it is more or less uniformly distributed throughout the southern sections of British Columbia. It will attack strawberry plantations when the native vegetation is removed and it has received its name, not because strawberries alone are attacked, but because this fruit offers a suitable form of nourishment to its taste. Strawberries being grown in consolidated areas under a high state of cultivation, naturally suffer to a marked extent. It is useless for growers to consider it advisable to purchase plants from non-infested districts, as is so often suggested. The statements made above naturally preclude this form of suggestion, apart from any remarks on the egg-laying period in relation to transplanting.

It seems a foregone conclusion that all strawberry plantations in this part of the world, are doomed to the possibility of infestation despite the efforts of the growers. Much, however, may be done to alleviate the nuisance. The control measures, while given on previous occasions, may well be mentioned again. They are briefly as follows:

1. Rotation of crops, which includes naturally the growing of strawberries in proportion to the land available on individual farms.

2. The production of strawberries on the "one" or "two-year cropping plan," which includes the choice of varieties suitable to these plans.

3. The removal of old or infested plantations by ploughing at the end of the egg-laying period, which ordinarily would mean in September. Such land should be thoroughly cultivated in the autumn and kept devoid of all vegetation during the winter.

If these suggestions are properly put into force it may reasonably be expected that little damage would result from the attacks of the weevil larvæ on the root system. It is urged that districts liable to infestation, entering upon the industry of strawberry culture, should adopt these plans before they are forced to do so by the presence of the weevil.

Experience has shown that it is common to find at times well over a hundred larvæ at work on the roots of individual plants, growing on the hill system, and yet the plant would not be dead. A totally unprofitable crop is the result, but the plant itself survives the ordeal. On enquiry it may be found, almost invariably, that the plantation is entering upon its third cropping year. Frequently one hears of severe infestation in young plantations, but in such cases it has been found that the land has been made the recipient of continuous crops of strawberries for several years. It is exceptional to find plantations devastated in the first year of growth or virgin soil, although a few instances of this have been reported.

On the Effect of "Burning Over" a Strawberry Field as a Means of Controlling the Strawberry Root Weevil.

During the past summer experiments were conducted on the efficiency of burning over an old strawberry plantation just previous to the termination of the crop. The plants, growing on the hill system, on approximately $1\frac{1}{2}$ acres, were "mattocked up" and roots, tops and straw-bedding raked into windrows. On about half the field the strawberry rows were raked into one windrow, while on the other half four rows were raked into one row. The plants were left in these rows for about 24 hours, the day being bright and sunny. In this way the plants were allowed to dry, making burning easier, and secondly those beetles left in the old strawberry rows would be forced to shelter in the windrows, during the night, as to a bait. Finally the rows were fired at a convenient point to utilize the prevailing breeze.

At the time this work was done the great majority of the

adults had transformed from the pupæ in the soil and were hidden away among the debris around the plants. Egg laying was in full swing and comparatively few larvæ and pupæ were left in the ground.

The results attending this experiment showed that a great many adults were destroyed by the action of the heat, but on the other hand a great many survived. The best results, as to mortality, were shown in the larger windrows where the heat appeared more sustained and concentrated. A number of adults were contained in small wooden boxes and glass vials, which were in turn sunk to the level of the soil in the row, and it was shown that without exception all perished. Careful observations were taken as soon as the fire had passed over to ascertain the general results on a practical scale, and it was interesting to note the remarkable ingenuity displayed by the weevils to avoid destruction. Under nearly every clod of earth or beneath compact piles of straw, which had not become ignited, were found small groups of adults, sometimes to the number of twenty, packed together as far away as possible from the source of heat. These weevils were perfectly normal and unharmed, and some laid eggs in captivity after removal from the field. In some instances adults had burrowed into loose soil to avoid destruction.

The general results of the work showed that burning the plantation at the time when the greatest number of adults were on the surface possessed only a half measure of success. The adults that survived would undoubtedly migrate to the nearby strawberry plantations and this, taking place at the season of the year when egg laying was in progress, was precisely what we should aim to avoid.

It may be said, however, that better results would probably attend this method of control if the roots of the plants were shaken free of soil and the lumps of earth broken and compacted in the windrow. If this were done burning of old plantations might be added to the control measures already mentioned.

NEW SPIDERS FROM CANADA AND THE ADJOINING STATES.

BY J. H. EMERTON, BOSTON, MASS.

In examining a large number of spiders from Canada and the northern United States, the following species appear to be undescribed. Six of them are from Metlakatla and other parts of the coast of British Columbia, collected by J. H. Keen and now in the collection of Nathan Banks, by whom several had been recognized as new and partly prepared for publication. Three are from Departure Bay on Vancouver Island, collected by T. B. Kurata, of Toronto. Two are from the mountains near Banff, collected by N. B. Sanson. Four are from Mt. Whiteface in the Adirondack Mts. of Northern New York, collected by the writer and C. R. Crosby, of Cornell University. The two *Philodromus* are from Ontario; one of them very common all over the eastern part of Canada.

***Lophocarenum sculptum*, n. sp.**

A little over 2 mm. long. Legs and palpi dull yellow. Cephalothorax and abdomen dark brown. Abdomen with a hard spot covering the whole back of the male and nearly the whole of the female as in *L. excavatum*, and in several *Ceratinella*. The abdomen is covered with depressed spots around the hairs. The

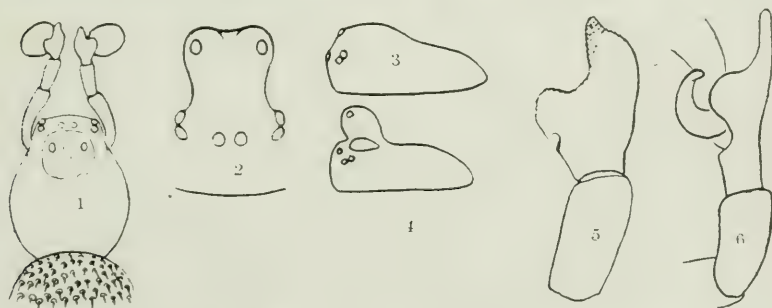


Fig 12.—*Lophocarenum sculptum*.—1, back of cephalothorax, part of abdomen and palpi of male; 2, front of head of male; 3, profile of cephalothorax of female; 4, profile of cephalothorax of male; 5, male palpus seen from above; 6, male palpus, outer side.

head of the male has a small, abrupt hump, carrying the upper middle eyes near the top; (Fig. 12, 2 and 4) it is slightly notched in the middle and constricted at the sides and in front, and under the

constricted part on each side is a deep groove. The female has a slight elevation of the head just behind the eyes. (Fig. 12, 3.) The male palpi are moderately long with the patella twice as long as it is wide, and the tibia widened at the end, with a pointed process on the inner side extending over the tarsus. (Fig. 12, 5 and 6.)

Metlakatla, B.C., from J. H. Keen in Nathan Banks' collection.

***Aræoncus patellatus*, n. sp.**

2 mm. long, pale without markings. The head is slightly elevated, more in the male than in the female. The upper eyes are more than their diameter apart, and farther apart in the male than in the female, almost touching the lateral eyes. (Fig. 13, 3.) The front middle eyes are small and near together, and as far from the upper eyes as these are from each other. The lateral eyes are in pairs touching each other, and surrounded by a common, dark border. The space between the eyes is covered by short, stiff hairs directed upward. (Fig. 13, 3.) The male palpi resemble slightly



Fig. 13.—*Aræoncus patellatus*.—1, epigynum; 2, male palpus, outer side; 3, head of male from above.

those of *Aræoncus bispinosus*. The patella is, as in *bispinosus*, twice as long as the tibia. The tibia is widened at the end, twice as wide as it is long, and has on the inner side a short, sharp tooth directed forward. (Fig. 13, 2). There are two rows of stiff hairs on the top of the tibia extending parallel as far as the anterior border and there turning toward the inner tooth. The tarsal hook curves in a half circle and ends in a dull point. (Fig. 13, 2.) The epigynum has two median processes, (Fig. 13, 1) the inner one T-shaped, much like the middle lobe in many *Lycosidæ*, the outer half as long and paddle-shaped.

Metlakatla, B.C., J. H. Keen.

***Gongylidium curvitaris*, n. sp.**

4 mm. long. Cephalothorax and legs pale yellow-brown. Abdomen gray with small, light spots of irregular shape and

arrangement, the middle ones sometimes in pairs. Size and general appearance like *Pedanostethus riparius*. The head is only slightly narrowed in front, but more in the male than in the female. The upper eyes are all of the same size and equal distances apart, the lower front pair half as large as the others and close together, but not touching. (Fig. 14, 5.) In the male the metatarsi of the front

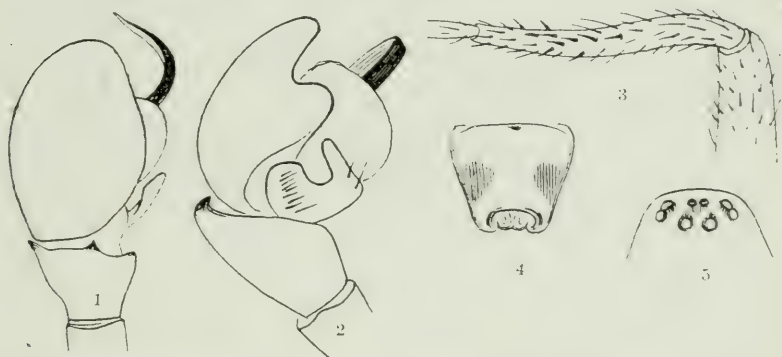


Fig. 14.—*Gongylidium curvilaris*.—1, male palpus, from above; 2, male palpus, outer side; 3, metatarsus of first leg of male; 4, epigynum; 5, eyes.

legs are slightly curved, and some of the hairs near the middle of the joint are thicker than the others. (Fig. 14, 3.) The male palpi resemble closely those of *G. (Tmeticus) brunneus* Em. of the White Mountains, but the tibia has a sharper and more recurved point. (Fig. 14, 2) the tarsal hook though nearly of the same shape has the point less widened and the palpal organ has a long, stiff tube curved in a half circle and extending beyond the end of the tarsus. (Fig. 14, 1 and 2.) The epigynum is like that of *brunneus* but longer, projecting farther from the surface of the abdomen (Fig. 14, 4).

Mt. Whiteface, Adirondacks, N.Y., in moss in spruce forest at 4,000 ft.. May 24, 1916.

***Gongylidium macrochelis*, n. sp.**

3 mm. long. Abdomen gray. Cephalothorax, legs and palpi dull orange. Resembles in size and colour *Tmeticus armatus* Bks., with which it was found. The head is low and wide, and the mandibles large and thick with a large tooth on the front and inner side as in *probatus* and *tridentatus*. The front of the mandibles has scattered elevations at the base of the hairs and on the

outer sides are fine, parallel, horizontal lines. There are three or four small teeth on the inner side of the claw groove. (Fig. 15, 1 and 2.) The maxillæ are wide and have several scattered elevations with one larger one near the front. The male palpi are

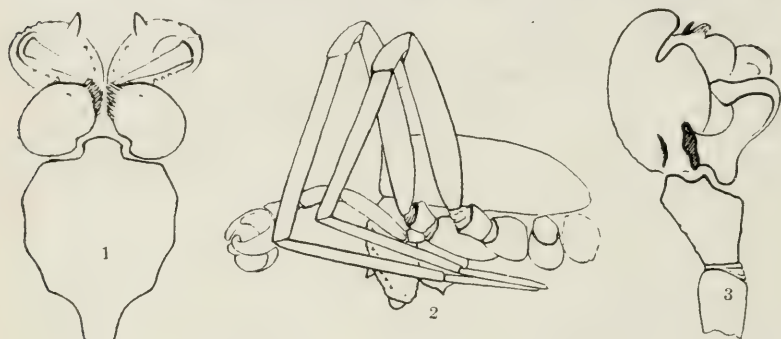


Fig. 15.—*Gongylidium macrochelis*.—1, sternum, maxillæ and mandibles of male; 2, side of male; 3, male palpus, outer side.

long, with both patella and tibia longer than wide. The tibia is widened toward the end but has no large processes. (Fig. 15, 3.) The tarsus is short and round and has a deep notch on the outer side. The tarsal hook is of a complicated shape, shown in (Fig. 15, 3). The base is thickened and near it is a round tooth turned toward the tibia. The end of the hook curves outward and reaches back to the edge of the tarsus.

Sulphur Mountain, Banff, N.B. Sanson. In April on snow in company with *Tmeticus armatus*.

***Gongylidium unidentatum*, n. sp.**

1.5 mm. long. Cephalothorax and abdomen gray and legs pale. Eyes as in *Tmeticus bidentatus*. Mandibles without any



Fig. 16.—*Gongylidium unidentatum*.—1, male palpus, above; 2, male palpus, outer side; 3, male palpus, inner side.

large tooth in front. Tarsus of male palpus extending over the tarsus half its length and pointed, with the point slightly turned down. (Fig. 16, 1, 2 and 3.) Tarsal hook simple.

Mt. Whiteface, Adirondacks, N.Y., C. R. Crosby. One specimen.

***Microneta clavata*, n. sp.**

2 mm. long, pale yellowish. Both sexes of the same size. The male palpi are small and coloured like the legs. The tibia is thickened toward the end, where it is as wide as long. The tarsal hook is simple in form, the basal half straight, following the edge of the tibia and the terminal half curved in a half circle (Fig. 17, 3.) The epigynum is large, with a smooth, rounded end extending backward, turned a little way from the surface of the abdomen. (Fig. 17, 4.)

Wilmington Notch, Adirondacks, N.Y. C. R. Crosby.

***Microneta pallida*, n. sp.**

A little over 2 mm. long and pale, without any markings. The abdomen is slightly thickened in front and pointed behind. The front of the head extends a little forward beyond the mandibles. The mandibles are thickened at the base and have a few

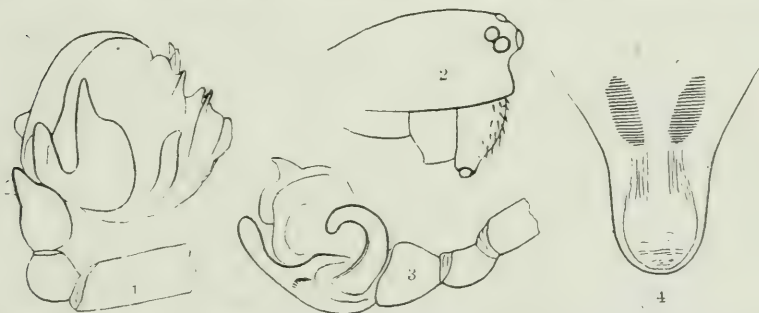


Fig. 17.—*Microneta pallida*.—1, outer side of male palpus; 2, profile of head and mandibles, *Microneta clavata*.—3, male palpus; 4 epigynum.

stiff hairs on the front as in *angulata* and *formica*. (Fig. 17, 2.) The male palpi have the tibia thickened in the middle and the end extended on the upper side over the tarsus. (Fig. 17, 1.) The tarsal hook is wide and flat as in *angulata*. The tarsus has on the upper

side two processes, neither very large; one near the base and the other in the middle.

Departure Bay, Vancouver Is., 1913, T. B. Kurata.

***Microneta orcina*, n. sp.**

2 mm. long. Legs pale. Cephalothorax pale yellow brown. Abdomen pale gray with lighter spots in pairs as in several *Diplostyla* and *Bathyphantes*. (Fig. 18, 1.) The cephalothorax is nearly as wide as long, with the front of the head not much over half as wide. The male palpi have the tibia enlarged at the end without



Fig. 18.—*Microneta orcina*.—1, dorsal markings of male; 2, male palpus; 3, male palpus, outer side.

any processes. The tarsal hook is straight where it crosses the end of the tibia and then curves in a half circle to a point, and on the outer side near the end is a slight projection (Fig 18, 3.) The palpal organ has a long, slender, transparent tube which curves around the end of the palpus in more than a complete circle. (Fig. 18, 2.)

Inverness, B.C. J. H. Keen. One specimen in collection of N. Banks.

***Diplostyla inornata*, n. sp.**

2 mm. long. Abdomen gray without markings or with only a trace of markings. Cephalothorax gray but lighter than the abdomen. Legs pale without markings. Palpi of male resembling those of *nigrina*, except that the tarsal hook is only slightly widened at the tip (Fig. 19, 5) and the basal process is slightly curved inward over the coil of the tube. (Fig. 19, 6.)

Mt. Whiteface, Adirondacks, N. Y., August, 1916.

Diplostyla keenii, n. sp.

3 mm. long. Cephalothorax pale with light gray radiating markings. Legs long and pale with faint gray rings at the end and middle of each joint. Abdomen pale with distinct gray markings, two pairs of large spots more or less connected on the front

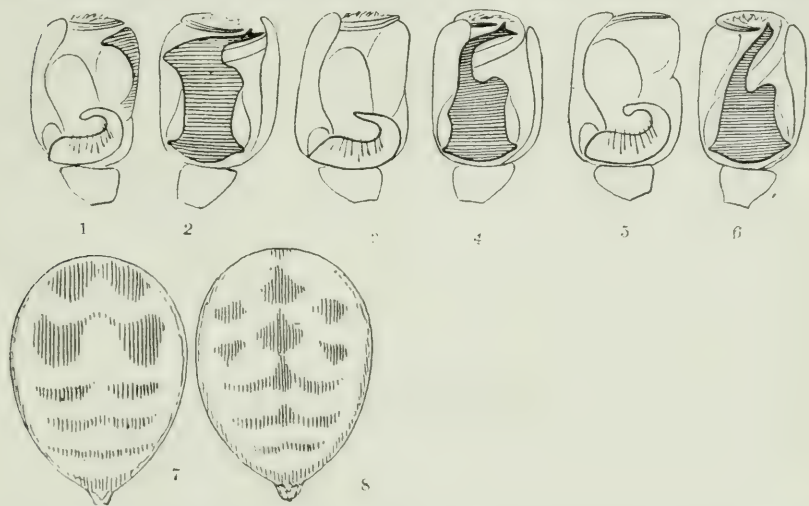


Fig. 19.—*Diplostyla*.—1 and 2, male palpus of *D. keenii*; 3 and 4, male palpus of *D. brevipes*; 5 and 6, male palpus of *D. inornata*; 7, dorsal markings of *D. keenii*; 8, dorsal markings of *D. brevipes*.

half and three transverse on the hinder half, the front one divided in two. (Fig. 19, 7.) The male palpus has the tarsal hook blunt pointed. (Fig. 19, 1.) The basal process is wide in the middle, with the inner corner much elongated. The slender portion turns off at a right angle. (Fig. 19, 2.) The epigynum is of the usual shape but very short, as in *alboventris*.

Metlakatla, J. H. Keen, in collection of Nathan Banks.

Diplostyla brevipes, n. sp.

3 mm. long. Cephalothorax and legs pale, dull yellow without any markings. Abdomen whitish with gray markings; on the front half, two spots in the middle line, each partly connected with two lateral spots; behind these three transverse marks, the front one partly divided in three (Fig. 19, 8.) The legs are unusually

short, the first femur but little longer than the cephalothorax. The male palpus has the tarsal hook pointed at the tip, and it is more pointed at the base than in the other species. (Fig. 19, 3.) The basal process of the palpal organ has the slender portion bent in the middle at nearly a right angle, and its point has a tooth turned outward as in *alboventris*, (Fig. 19, 4.) The epigynum has the two processes straight and of middle length.

Metlakatla, B.C. J. H. Keen, in the collection of Nathan Banks.

***Pardosa metlakatla*, n. sp.**

In size, colour and markings resembling *P. glacialis*, but differing from it in the epigynum and male palpi. The epigynum is narrow like that of *atra*, but the middle lobe is shorter and wider and widened at the end as in *sternalis*. (Fig. 20, 3.) There is no large depressed area as in *glacialis*, and there is hardly a trace of the anterior pits. The palpal organ has the basal process somewhat crescent-shaped, the lower point being shorter and the upper more pointed than in *glacialis*. (Fig. 20, 4.) The small process on the outer side which supports the end of the tube is less pointed than in *glacialis*. The tarsus is longer and more pointed, and the tibia less thickened than in *glacialis*, and lighter coloured and less thickly covered with hair.

Metlakatla, B.C. J. H. Keen. Mountains north of Vancouver. W. Taylor.

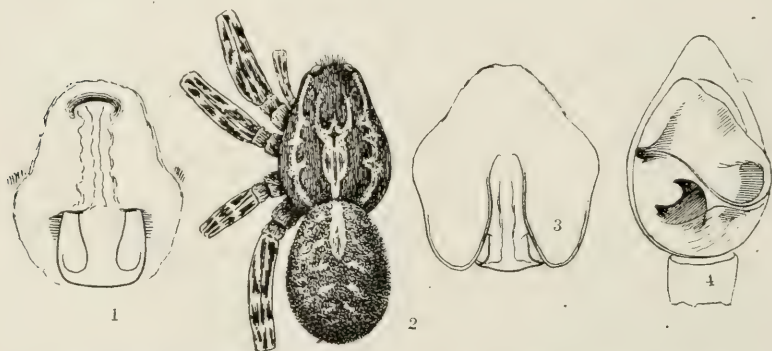


Fig. 20.—*Pardosa vancouveri*.—1, epigynum; 2, dorsal markings. *Pardosa metlakatla*.—3, epigynum; 4, male palpus.

***Pardosa vancouveri*, n. sp.**

7 mm. long. Gray with the colour much broken into spots of irregular shape. The cephalothorax has three light stripes, the middle one two-thirds as long as the cephalothorax, widened at the front end and divided in three. (Fig. 20, 2.) The side stripes extend the whole length of the cephalothorax and are of irregular width. The legs are darkest at the base, and have broken and irregular spots on all the joints. The abdomen has the usual long middle spot at the front end, behind which are small, irregular, light spots in pairs. On the under side the colours are somewhat lighter on the coxæ and femora, and the abdomen has three indefinite dark stripes on a light ground. The epigynum is long and partly divided into two parts. The anterior end has a wide, distinct pit, from which a soft and narrow ridge extends backward as far as the transverse division. (Fig. 20, 1.) The posterior half has a wide middle lobe in which is a ridge approaching the form of a T. (Fig. 20, 1.) The male is yet unknown.

Departure Bay and Vancouver, in gardens and fields. T. B. Kurata.

***Præcilochroa columbiana*, n. sp.**

Cephalothorax 2.5 mm. long. Abdomen variable in size according to contents. Cephalothorax orange brown with black hairs. Legs orange yellow except the femora, which are dark like the cephalothorax, the first and second femora sometimes darker than the others. The abdomen is black with a white, transverse stripe at the front, two transverse spots in the middle, and sometimes a few white hairs in front of the spinnerets. On the under

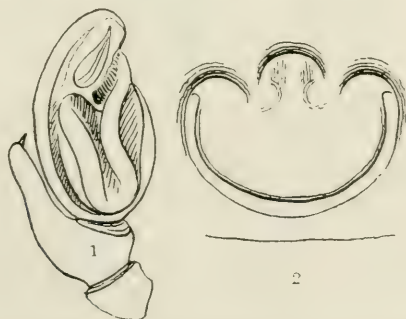


Fig. 21.—*Præcilochroa columbiana*. 1, male palpus, under side; 2, epigynum.

side there are no definite markings, but the abdomen is usually lighter in the middle and toward the front, and the posterior coxæ are lighter than those in front. The male is darker than the females. The epigynum has a middle and two lateral pits in front, and a rounded lobe directed backward and fitting into a larger depression. (Fig. 21, 2.) The male palpus somewhat resembles that of *P. montana*, but the process of the tibia is smaller and the point less turned backward. (Fig. 21, 1.) This species is distinct from *P. pacifica* Bks., with which it has been compared.

Departure Bay, Vancouver Island, 1913, T. B. Kurata.

***Philodromus canadensis*, n. sp.**

5 mm. long. Second femur of male 3 mm. Marked in gray (Fig. 22, 3) much like *P. vulgaris* and like *P. bidentatus* with which it is sometimes associated, but it does not have the sharp division between the dorsal and ventral colour areas that is usual in *vulgaris*. It has somewhat shorter legs than *bidentatus*, especially in the males. The male palpi resemble those of *vulgaris*, but the outer

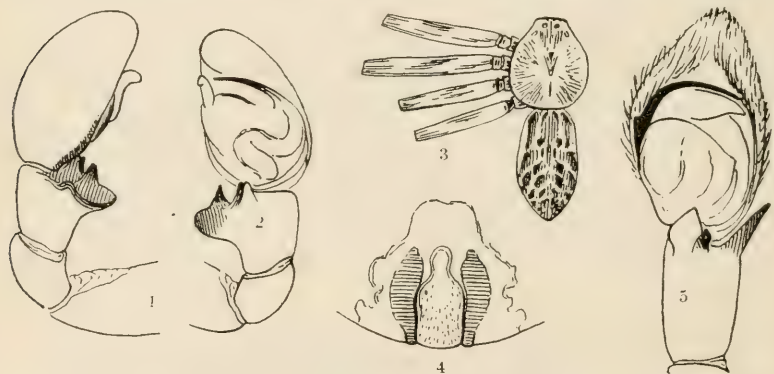


Fig. 22.—*Philodromus macrolarsus*.—1, male, palpus, upper side; 2, male palpus, under side. *Philodromus canadensis*.—3, dorsal markings; 4, epigynum; 5, male palpus, under side.

process of the tibia is narrower and the under process more triangular and with a short truncate tooth at its base, a little curved toward the outer side of the palpus. (Fig. 22, 5.) The tibia is wider in the middle than in *vulgaris*, and widened more on the inner than on the outer side. (Fig. 22, 5.) The epigynum resembles that of *vulgaris*, but is shorter. (Fig. 22, 4.)

Common about Montreal and Ottawa and westward to Lake Nipigon and Prince Albert; Grand Isle, Lake Champlain; Sandusky, Ohio.

***Philodromus macrotarsus*, n. sp.**

4 mm. long. Femur of second leg 3 mm. The specimen, a male, is freshly molted and light in colour. The abdomen has a series of transverse marks in light and dark gray, and the legs are indistinctly ringed in the middle and near the ends of the joints. The male palpus has the tibia twice as wide as long, most of the width being on the outer side. (Fig. 22, 1.) On the projecting portion is a black pointed process directed forward and visible from above or below. On the under side is a double process also directed forward, the outer half dark and the inner half translucent brown. The palpal organ has on the end near the outer side a short, stout process curving downward and opposite to it is the dark pointed tube. (Fig. 22, 2.)

Vineland, Ontario. W. A. Ross, Sept., 1916.

***Chalcoscirtus carbonarius*, n. sp.**

Female 4 mm. Male 3 mm. long. Dark gray, the male almost black, the female with the abdomen lighter than the cephalothorax and lighter below than above, without any markings. There are very small, scattered hairs all over the body and the skin is roughened with fine, irregular lines, and in some lights is

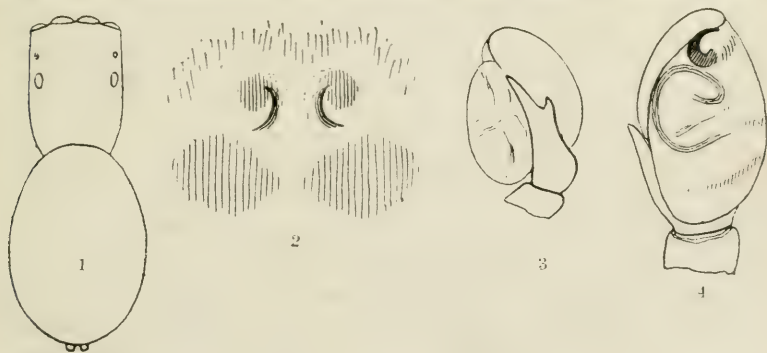


Fig. 23.—*Chalcoscirtus carbonarius*.—1, outline of female; 2, epigynum; 3, male palpus' outer side; 4 male palpus, under side.

slightly iridescent. The abdomen is longer than the cephalothorax. The cephalothorax is one-half longer than wide, with the

sides straight and parallel. (Fig. 1.) The eye area is wider than long, the front row of eyes covers the whole width of the head, and the small, middle eyes are nearer the upper pair than the front row. The leg of the first pair is not much thicker than the others in either sex, and the tibia has on the under side three pairs of long spines. The mandibles have no teeth under the claw. The male palpi have the tibia as long as wide, with a long process extending half the length of the tarsus and having a sharp tooth in the middle of the upper edge. (Fig. 23, 3.) The palpal organ is oval and thick, extending back at the base over part of the tibia. (Fig. 23, 3 and 4.) The tube is at the tip and is short and curved in a half circle. (Fig. 23, 4.) The epigynum has two small, semi-circular openings behind which the round spermathecae show through the skin. (Fig. 23, 2.)

Simpson summit, 7,000 ft., near Banff; a smaller species, *C. montanus* Banks, is found on Mt. Washington, N. H., above the trees.

ON SOME NEW OR NOTEWORTHY COLEOPTERA FROM THE WEST COAST OF FLORIDA.—III.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

(Continued from page 240.)

***Elytroleptus floridanus* Lec.**

One example of this rare form was beaten from oak on March 23. It was described from Florida in 1862, and Schwarz records the taking of a single specimen at Haulover.

***Plectomerus dentipes* Olivier.**

Three examples of this small and well-marked Longicorn have been taken by beating oak in November and December.

***Zagymnus clerinus* Lec.**

Schwarz records this species as very rare in the stems of dry palmetto leaves. Five specimens have been taken at Dunedin, three on pine lumber in October and December, the others at electric porch light in June. Two of the five are wholly black, one of them being 19 mm. in length. The others are typical in hue, the head and thorax red and the elytra maculate, the length 13–15 mm.

August, 1917

***Cryptocephalus nanus* Fab.**

One specimen by beating in a wet hammock, March 27. LeConte records* it from Arkansas and Florida. No other Floridian record is known to me.

***Cryptocephalus calidus* Suff.**

One specimen beneath chunk near pond. Not before recorded definitely from Florida.

***Pachybrachys stygicus* Fall.**

Occurs frequently on huckleberry foliage and flowers in autumn and spring. Fall's types were from a number of localities in Florida and Alabama.

***Pachybrachys characteristicus* Suff.**

Fall also records this from several localities in Florida.** One specimen was secured at Dunedin in a wet hammock.

***Monoxia batisia*, sp. nov.**

Elongate-oblong, feebly convex. Fuscous-black, above thickly clothed with short, prostrate, silken yellow pubescence, the blackish ground colour showing in a narrow median line on head and thorax and in some irregular spots and short curved lines along the inner portions of, and some rows of minute dots along the sides of each elytron; antennae and legs reddish-brown, more or less annulate or tinged with fuscous; under surface fuscous, very sparsely and finely pubescent. Head with a broad, shallow but distinct median impression. Thorax nearly twice as wide as long, not narrower at apex than base, sides broadly curved and rounded into the base, which is distinctly, obtusely emarginate at middle, front angles obtusely rounded; disc finely and closely punctate and with a vague median impression and another each side. Elytra one-third wider and five times as long as thorax, sides parallel for three-fourths their length, then curved into the rounded apex; disc more or less uneven, finely, densely and deeply reticulate-punctate. Male with tarsal claws bifid one-third their length, the last ventral broadly and deeply emarginate. Female with claws simple, last ventral truncate or nearly so. Length, male, 3.5 mm.; female, 4-4.3 mm.

*Trans. Amer. Ent. Soc., VIII, 1880, 201.

**Trans. Amer. Ent. Soc., XLI, 1915, 376.

Swept in numbers, January 29—April 2, from the foliage of the fleshy-leaved seaside plant, *Batis maritima* L., which covers large tracts along the inner borders of the mangrove swamps on Hog Island, opposite Dunedin. With the exception of *puncticollis* Say, 7–8.5 mm. in length, this is the only *Monoxia* definitely known from east of the Mississippi River, though LeConte, in 1865,* mentioned one of his types of *obtusa* (now placed as a synonym of his *debilis***) as having been found at Andover, Mass. Horn in his "Galerucini" states,*** however, that this locality "is much more than doubtful." From *debilis* *M. batisia* may be known by the much more distinct median impression of head, different form of thorax with the basal margin distinctly emarginate and by the much deeper emargination of the last ventral of male.

In this connection it may be mentioned that Fabricius in 1801†, described from Carolina a *Galeruca atomaria*, the status of which is in doubt. His description, based mainly on colour, is as follows:

"*atomaria*, G.—Pallida, elytrorum sutura, atomisque ferrugineis. Statura parva *G. tenellæ*. [3.2–4 mm.] Antennæ ferrugineæ. Caput ferrugineum, vertice nigro. Thorax marginatus, pallidus, immaculatus. Elytra lævia, pallida, sutura, quæ tamen apicem haud attingit, puncto maiori distincto in medio atomisque ferrugineis. Corpus pallidum."

Habitat in Carolina Mus. D. Bosc.

LeConte (loc. cit. 205) states that "this was probably a species of *Monoxia*," and it was so listed by Gemminger & Harold. It is possible that this is the species I have described as *M. batisia*, but it cannot be so determined from the brief description of Fabricius.

***Haltica nana* Crotch.**

One specimen swept from low herbage, October 26. Horn† gives its range as South Carolina to Florida.

*Proc. Phil. Acad. Nat. Sci., 222.

**Since *obtusa* was described first on the same page, it should be made the name of the species, with *debilis* as the synonym.

***Trans. Amer. Ent. Soc., XX, 1893, 86.

†Syst. Eleut. I, 490.

‡Trans. Amer. Ent. Soc., XVI, 1889, 221.

***Haltica marevagans* Horn.**

Taken in some numbers by sweeping the sea purslane, *Sesuvium maritimum* Walt., along a dredged ditch on Hog Island. Feb. 5—March 25. Horn, (loc. cit., p. 226) states that it occurs along the sea coast region from Florida to New Jersey.

***Chætocnema brunnescens* Horn.**

This handsome little bronzed-brown species was swept from the sea-blite, *Batis maritima* L. on Hog Island, February 27, a dozen or more being taken. As pointed out by Horn* its peculiar colour and distinctly punctured head make it easily known. His types were taken by Schwarz at Key West (who also took a series at Punta Gorda) and we can find no other published record.

***Blapstinus aciculus*, sp. nov.**

Elongate-oval, feebly convex. Above piceous-black, very finely alutaceous, subopaque, sparsely clothed with minute prostrate brownish-yellow hairs; beneath piceous, legs and antennæ dark reddish-brown. Head almost flat, finely, sparsely and evenly punctate, the clypeus broadly emarginate. Antennæ gradually enlarged toward apex, second joint one-half the length of third, the latter slightly longer than fourth. Thorax subquadrate, one-fourth wider than long, sides subparallel from base to apical third, then gradually converging to the apical angles which are obtuse; hind angles rectangular, base feebly bisinuate; disc finely, evenly and rather sparsely aciculate punctate. Elytra at base but slightly wider than thorax, sides very feebly diverging to behind the middle, then broadly curved to apex; striæ rather deep, their punctures fine and well separated; intervals convex, each with numerous minute punctures, each one of which bears a very fine hair. Under surface of abdomen finely and sparsely punctate, that of prosternum reticulate-punctate. Male with three basal joints of front tarsi rather widely dilated and spongy pubescent beneath, first three segments of abdomen widely and shallowly concave, the fifth with a broad, rounded concavity at middle. Length 4.5 mm.

Described from four males taken December 22–24 beneath dried cow dung in a sandy lane. Allied to *humilis* Casey, but body broader and form and sculpture of thorax, and secondary sexual characters very different. Specimens have been sub-

*Trans. Amer. Ent. Soc., XVI, 1889, 260.

mitted to Mr. Fall and Col. Casey, and both say it is unlike any species known to them.

***Arrhenoplita ferruginea* Lec.**

A colony of 20 or more adults of this interesting Tenebrionid were taken on Jan. 25 from a woody fungus on the side of an oak log. Larvæ and pupæ were also present. Described from Louisiana, Schwarz lists it as rare at Enterprise, Fla., in company with *Boletotherus bifurcus* Fab.

***Helops cisteloides* Germ.**

I can find no mention of this species in any of the published lists of Florida beetles. Horn in his "Tenebrionidæ"* gives the "Gulf States" as its habitat. About Dunedin it is quite frequent during the winter months, a score or more being taken from between the bundles of a stack of shingles, and others at porch light.

***Mycetochares puncticollis*, sp. nov.**

Elongate, slender, subparallel. Black, very sparsely clothed with a fine, prostrate, brownish-yellow pubescence; elytra each with a large oval reddish-yellow humeral spot; antennæ, labrum, tibiæ and tarsi pale brownish-yellow, femora and under surface piceous. Eyes rather large, separated by twice their width. Thorax nearly twice as wide as long, basal foveæ two, small; sides broadly curved, hind angles obtuse; surface, as well as that of head, finely, very densely and evenly punctate. Elytra as wide at base as thorax, disc without trace of striæ, very finely and closely rugosely punctate. Under surface minutely and sparsely punctate. Front coxæ separated by a prosternal process. Length 3.8 mm.

Described from a single specimen sifted from dead leaves, March 8. Allied to *fraterna* Say but differs from it and all other described species by the fine, dense punctuation of thorax. The pale spot of elytra is oblong-oval and confined to the humerus, whereas in *fraterna* it is much larger and placed obliquely between humerus and suture.

***Anthicus convexulus* Casey.**

Single specimens were swept from huckleberry on March 20 and April 8. Described from South Carolina.

*Trans. Amer. Phil. Soc., XIV, 1870, 936.

Eleminus ashmeadi Casey.

Four examples have been taken at Dunedin, February 23—April 11, by sweeping ferns in a wet hammock, and another at Sanford on March 28. The unique type of Casey was from St. Nicholas, Florida.

Zonantes schwarzi Casey.

A specimen of this well-marked, little Anthicid was beaten from the flowers of the Virginia willow, *Itea virginica* L., in a wet hammock on March 27. Only the type, described from Biscayne Bay, Fla., has heretofore been recorded. From Casey's description* the Dunedin specimen differs somewhat in colour, the median black bar of elytra being broken at the suture, while the legs are pale except the femora which are black at base.

Sandytes ptinoides Schz.

This species occurs on ferns and other foliage in wet hammocks. Two specimens have been taken near Dunedin, one December 17, the other March 12. It is recorded from New Smyrna and Enterprise by Schwarz as very rare.

Gnathium francilloni Kirby.

Four specimens taken by sweeping low vegetation along the margin of a pond, October 26. No previous published Florida record can be found.

Nemognathus nemorensis Hentz.

One specimen taken with the preceding. "Tampa, very rare," is Schwarz's record.

Nemognathus vittigera Lec.

Ft. Myers, Sarasota and Dunedin, one specimen from each locality; March 4—June 10; the one on the latter date at porch light, the others on flowers of thistle. Le Conte gives its range** as Illinois, Missouri and Texas.

Alloxaxis pleuralis Lec.

Six specimens at porch light; June 10—July 5.

Alloxaxis floridana Horn.

Also at porch light, nine specimens having been taken in June and July. It is very probable that this will prove to be only a

*Ann. N.Y. Acad. Sci., VIII, 1895, 783.

**Trans. Amer. Ent. Soc., VIII, 1880, 215.

pale variety of the preceding. Horn's unique type was from Biscayne Bay.

***Paragraphus setosus* Blatch.**

This genus and species were founded* on a single specimen taken in the axils of a thistle on Hog Island. Especial attention was given to the search for additional examples during the past winter. On December 27, the first visit to that portion of the island where the type was found, more than 40 thistles were chopped up, and 71 examples of *Agraphus bellicus* Say taken from their axils, as well as a number of *Tanymecus lacæna* Hbst., but no *Paragraphus*. On January 29 another trip was made. The two species mentioned were still found but in diminished numbers, and after a long search a single example of the *Paragraphus* rewarded my efforts, so that now two are in my collection. Both the type and its mate were taken within 50 yards of one another, and within that distance of the Gulf beach on the western side of the island and about the middle of its length.

***Conotrachelus maritimus*, sp. nov.**

Oval, robust. Dark reddish-brown, vertex and elytra thinly clothed with short, scale-like prostrate reddish hairs; elytra each with a small spot of similar white hairs at the bases of the third and fifth intervals, and a minute tuft of mixed white and reddish scales near apex of third interval. Beak as long as thorax, male, as head and thorax, female, finely carinate above, striate on sides, coarsely and densely punctate. Thorax almost naked, bell-shaped, about as wide as long, sides broadly rounded, much narrowed in front, base bisinuate; disc with a trace of a very fine median carina, coarsely, very densely and deeply reticulate-punctate, each puncture enclosing a prostrate, oblong reddish scale. Elytra oval, nearly twice as wide at base as thorax, sides straight from base to middle, then strongly converging to the obtuse apex; striæ feebly impressed, each marked with a row of small, rounded punctures, each puncture partly closed by a prostrate, oblong scale; third, fifth and seventh intervals slightly elevated, all the intervals with a row of very short, erect black bristles, those on the declivity more evident and in part paler. Under surface and femora coarsely and densely punctate, each

*Rhynchophora of N. E. Amer., 1916, 110.

puncture scale-bearing like those of thorax. Femora armed with a small obtuse tooth; claws with a long acute one. Length 3.5-3.8 mm.

A compact and prettily marked little species, described from nine specimens taken singly or in pairs, February 17-22, beneath chunks of dead stems of saw palmetto along the borders of a thinly wooded tract one mile north of Dunedin, on the margin of Clearwater Bay. None of them were more than 50 feet from the edge of the water at high tide. The species belongs to Group III of the genus *Conotrachelus* as treated in the Rhynchophora of N. E. America. In some of the specimens the elytra are in part faintly mottled with minute patches of isolated white scales.

Anchonus duryi Blatch.

This peculiarly sculptured Cossonid was described* from specimens taken at Sarasota and West Palm Beach. It is also in the National Museum from St. Petersburg, 21 miles south of Dunedin. Single specimens were taken during the winter, January 24 and February 17, both under the same conditions and in the same locality as the *Conotrachelus* above described.

Since the second paper of this series appeared in the July Canadian Entomologist, Mr. E. A. Schwarz has called my attention to the fact that the name *Ischyrys tripunctatus* has been preoccupied by Crotch (1873) for a Santo Domingo species. The species I described under that name may, therefore, be known as *Ischyrys dunedinensis*.

Mr. Schwarz also cited me to a paper by H. G. Hubbard (Psyche, Vol. IV p. 215) on *Hypotrichia spissipes* Lec., in which the female is first described and the habits of both sexes given from specimens observed at Crescent City, Fla.

In addition to the localities given for *Chlorophorus annularis* Fab., Schwarz adds China, Japan and the Philippines, where it breeds in bamboo, a plant which has been introduced extensively in and about Dunedin. He states that; 'Unless the beetle becomes established in the bamboo debris wherever the plant is grown in this country, it should not be included in our lists.'

*Rhynchophora, p. 521.

LOUISIANA RECORDS OF THE BINDWEED PROMINENT.
(*SCHIZURA IPOMEÆ* DDY.)

BY E. S. TUCKER, STATE AGRICULTURAL EXPERIMENT STATION.
BATON ROUGE, LA.

Three specimens of a prominent caterpillar were collected on rose leaves, at the home of the writer in Baton Rouge, La., October 4, 1913. On being confined with the sprigs of the plant on which they fed for a while, one soon pupated in an oval cocoon covered with fragments of dried leaves. Another only succeeded in spinning a similar cocoon, as it died inside of the latter without pupating. The third failed entirely. Not until after a moth was found to have emerged from the first cocoon, on January 28, 1914, the adult then being somewhat rubbed but alive, could the species be positively identified. A critical study of the specimen led to the conclusion that it represented the bindweed prominent, *Schizura ipomeæ* Ddy. The larvæ had agreed as closely with figures of same stage of *Schizura unicornis* S. & A. as with that of the determined name, according to Packard's monograph.

Again at the same place on September 25, 1914, similar larvæ of medium size were taken while feeding on the rose leaves. These examples agreed more closely with Packard's figures of the bindweed prominent than with the unicorn prominent. They pupated about 10 days later, each in the same kind of cocoon as mentioned in the preceding case.

Slight attacks by what appeared to be the same species of caterpillar on pecan foliage came to the writer's attention while inspecting nursery stock at Ferriday, Concordia Parish, La., on September 16 of the latter year. Then under date of the 29th of the same month, a correspondent at Newroads, Pionte Coupee Parish, La., sent like specimens, complaining that the caterpillars were eating the foliage of his young pecan trees. He added, however, that only a few of his trees which had been set out during the preceding winter were attacked so far, and the insect seemed to prefer the less vigorous growth. In asking information about it, he desired to know if means of control would be necessary, and if so, what treatment would be advisable. For reply, the opinion was given that unless the insect became very numerous it could

August, 1917

hardly do much harm owing to the lateness of the season. In case its depredations should ever present a serious aspect, however, it could easily be poisoned with an arsenical spray.

On August 3, 1915, the writer once more recognized a partially grown caterpillar by its markings and form as the same species, this occurring on a rose bush of a florist's place at Hammond, Tangipahoa Parish, La. As the grower had made a practice of picking off and destroying all such enemies on his plants, he had kept his stock free from ravages.

An inquiry dated October 30 of the same year, which was received from Plaquemines, Iberville Parish, La., brought the species to further notice by referring to a specimen of worm which was destroying rose bushes. Inspection of the accompanying material revealed a partly grown caterpillar answering in all particulars to the bindweed prominent.

A NEW SPECIES OF PHENACOCCLUS (HEMIPTERA, HOMOPTERA).

BY A. H. HOLLINGER, COLUMBIA, MO.

Phenacoccus pettiti, sp. nov.

Eggs.—Apparently just deposited under the body of the adult female with only a few fine, white, waxy hairs to hold them together, but not enough to be called an ovisac; egg-shells white.

Young.—Lemon or straw-coloured, about 5 mm. long; ovoid with rather broadly rounded extremities; antennæ and legs pale yellow; antennæ about one-half the length of the body or the length of the transverse diameter of the body; very active; eyes blackish; apparently ventrally placed and far apart; a stout, white waxy spur arising from between the anal lobes.

Adult female.—About 2.5 mm. long and 1.3 mm. wide; oval-elliptical; somewhat truncate across the cephalic end; white, waxy exudation at the anal end; body slate-gray to brownish-gray; covered both dorsally and ventrally with a white secretion of waxy powder; on the dorsum laterad of the median line are two rows of abdominal and thoracic depressions which are lacking in secretion; lateral margins covered with abundant white, woolly, waxy secre-

tion, occurring also more or less abundantly over the dorsum, but especially noticeable in irregular longitudinal masses between the latero-medial rows of depressions on the dorsum, and also laterad of each row; a fringe of seventeen short, white, waxy spurs along

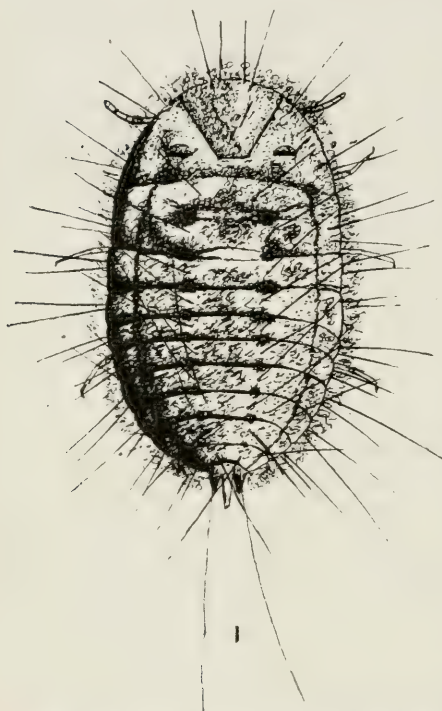


Fig. 24. — *Phenacoccus pettiti* n. sp., greatly enlarged. Note the two longitudinal rows of dorsal depressions and the long, waxy filaments.

either lateral margin of the body; the two caudal ones being the longest; entire dorsum bearing long, thin, silken, glass-like hairs, some of which are as long or longer than the insect; they break off very easily, but are soon replaced by new ones; iridescent; apparently arising from definite locations, for some of them are marginal, arising from about the middle of each segment while others are just anterior and posterior to each dorsal depression; apparently more in the caudal than in the cephalic region, as many as ten arising from the fourth segment from the anal end of one female; legs and antennæ pale brownish, when boiled in 10% KOH turns red-brown to brick-

red, but does not colour the solution.

Adult female mounted,—2.7 mm. long and 1.8 mm. wide; *derm* in cephalic region bearing numerous long and short body hairs, most numerous cephalad of the mouth-parts and between the basal segments of the abdomen; also with numerous short and long body hairs in proximity to the anal orifice; cerarius type of gland-pores scattered over the *derm*; several large gland-pores of the "circumgenital" type also near the anal opening; many large

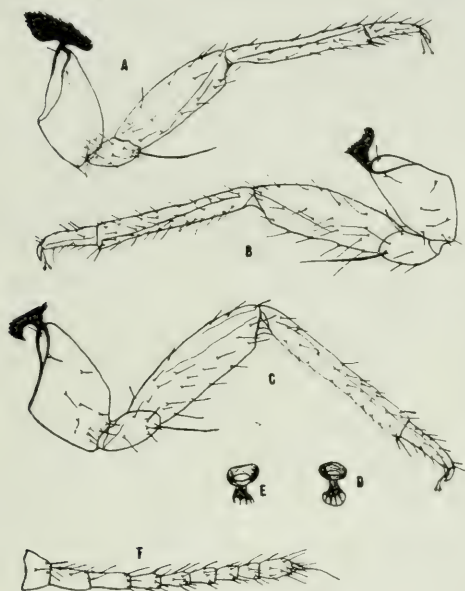


Fig 25.—*Phenacoccus peltiti* n. sp., A, fore leg; B, middle leg; C, hind leg; D, anterior spiracle; E, posterior spiracle; F, antenna.

body-glands near the margins of the body as well as a few scattered over the surface; these glands project above the derm, as in figure; legs and antennæ very well developed, strongly chitinized, and with numerous long hairs; *antennal formulæ* variable, as follows: 325946178, 32(59)46178, 3(92)5416(78), (23)9154678, (23)95146(78), 329514678, 329(154)678, 32-954(16)78, 329546178, 329-546187, 32945(61)78, 32945-1678, 3(29)51(46)78, 3(29)541678, 3925(16)478, 3(92)514678, and 3(29)5(146)78; antennal curves as in diagram, *leg measurements*

showing the extremes as follows:

	<i>Trochanter and Femur</i>	<i>Tibia</i>	<i>Tarsus</i>
Prothoracic leg.....	350 x 91	279 x 41	103 x 27
Mesothoracic leg.....	368 x 94	309 x 35	121 x 32
.....	376 x 94	320 x 38	115 x 32
.....	385 x 97	323 x 44	118 x 32
Metathoracic leg.....	412 x 94	368 x 47	118 x 32
.....	420 x 97	397 x 50	132 x 32

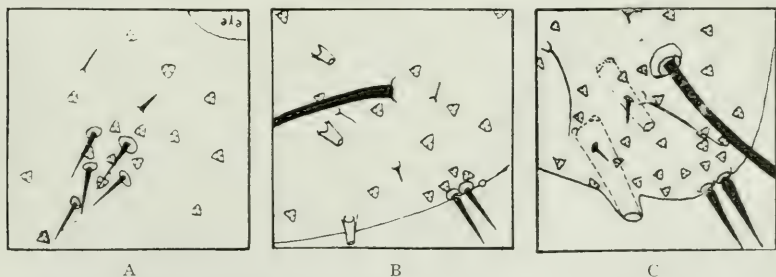


Fig. 26.—*Phenacoccus peltiti* n. sp., A, cerarius of anal lobe on ultimate segment; B, cerarius of penultimate segment; C, second head cerarius.

Tarsal claws 32 mmm. long; tibial spines vary from 20 mmm. to 30 mmm. in length; trochanteral spine varies from 118 mmm. to 147 mmm. long, being of constant length in each specimen; *spiracles* large and Sclerotinia-shaped; *anal lobes* slightly developed, well rounded on the distal ends, and each bearing a seta or hair varying from 265 mmm. to 295 mmm. in length; also bearing several other hairs of varying lengths, from very minute (about 5 mmm.) to longer ones (45 mmm. to 90 mmm.); also bearing *cerarii* composed of two stout, conical spines, surrounded by several small, obscurely-triangular wax pores; also bearing four large gland-pores, two on each lobe, and about 20 mmm. in diameter,

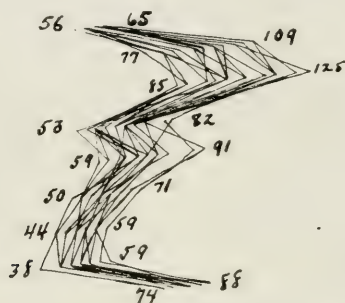


Fig. 27.—Antennal curves of *Phenacoccus pettiti* n. sp.

from which lead cylindrical tubes; *cerarii* distinct and somewhat elevated upon rounded protuberances; *cerarii* of the ultimate and penultimate segments and the second head group as in figures.

Type locality.—Vicinity of Columbia, Boone County, Mo.

Remarks.—The writer names this species in honour of Professor Pettit, Entomologist of the Michigan Agricultural Experiment Station. It has been found in the act of feeding on *Ambrosia trifida*, *Psedera quinquefolia*, *Rhus toxicodendron*, *Cercis canadensis*, *Symphoricarpos orbiculatus*, and *Fraxinus americana*. It was collected from *Celtis occidentalis*, *Carya ovata*, *Ostrya virginiana*, and *Acer saccharum* upon which it was merely crawling. It is distributed in Missouri in Gentry, Jackson and Boone counties, and it has been reported to the writer from Kansas. The characteristic dorsum of this species will distinguish it in the field while mounted specimens show many distinguishing characters, most important of which are the projecting glands in the anal lobes.

NOTES ON NEBRASKA BEMBICINÆ.

BY CLARENCE E. MICKEL, LINCOLN, NEBRASKA.

Recently the writer worked over the material of the sub-family Bembicinae in the entomological collection of the University of Nebraska. In view of the fact that there seems to be very little Nebraska material of this sub-family in other entomological collections and since a monograph of the Bembicinae has lately appeared, the time seems opportune to publish a list of the Nebraska species. Some notes on synonymy are also included.

Genus STICTIELLA Parker.

Stictiella pictifrons (F. Smith).

Specimens examined: 2 ♀'s. Omaha, 1; Weeping Water, 1. July.

Stictiella plana (Fox).

Specimens examined: 3 ♀'s, 4 ♂'s. McCook, 1; Halsey, 3; Mitchell, 2; Glen, 1. July 10 to August 15.

Stictiella emarginata (Cresson).

Specimens examined: 4 ♀'s, 4 ♂'s. South Sioux City, 1; Maskell, 2; Mitchell, 1; Warbonnet Canyon, 4. June 28 to July 24.

Stictiella speciosa (Cresson).

Specimens examined: 6 ♀'s. Haigler, 1; Sidney, 4; Mitchell, 1. August.

Stictiella spinifera (Mickel).

1916, *Stictia spinifera* Mickel, Trans. Amer. Ent. Soc., XLII, p. 418, ♂.

1917, *Stictiella melampous* Parker, Proc. U. S. Nat. Mus., LII, p. 43, ♂.

The writer has carefully compared the type of *spinifera* with the description and figures of *melampous* published by Mr. Parker, and finds *melampous* to be identical with *spinifera*.

Specimens examined: 3 ♂'s. McCook, 2; Glen, 1. July, August.

Stictiella exigua (Fox.)

Specimens examined: 6 ♀'s, 2 ♂'s. Glen, 7; Warbonnet Canyon, 1. July 12 to August 17.

Stictiella divergens Parker.

1917, *Stictiella divergens* Parker, Proc. U. S. Nat. Mus., LII, p. 55, ♂.

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Attention should be called to the fact that *Stictiella exigua* Mickel, ♂ (Trans. Amer. Ent. Soc., XLII, p. 419) is the same as *divergens*. However, Mr. Parker has assigned another male to *exigua* in his monograph. Biological evidence is needed to show which of these is really the male of *exigua* and to determine the status of the name *divergens*.

Genus BICYRTES Lepeletier.

Bicyrtes fodiens (Handlirsch).

Specimens examined: 1 ♀, 1 ♂. Louisville, 1; Meadow, 1. July.

Bicyrtes ventralis (Say).

Specimens examined: 12 ♀'s, 31 ♂'s, Nebraska City, 1; Omaha, 8; South Bend, 3; Lincoln, 2; Cedar Bluffs, 2; Neligh, 1; Carns, 3; Halsey, 1; Mitchell, 12; Gordon, 1; Glen, 8; Monroe Canyon, 1; Warbonnet Canyon, 1. June 25 to September 27.

Bicyrtes quadrifasciata (Say).

Specimens examined: 9 ♀'s, 16 ♂'s. Omaha, 14; Louisville, 8; South Bend, 1; Meadow, 1; Haigler, 1. July 4 to September 12.

Bicyrtes capnoptera (Handlirsch).

Specimens examined: 5 ♀'s, 2 ♂'s. Mitchell, 7. July 20 to September 4.

Genus BEMBIX Fabricius.

Bembix arcuata Parker.

Specimens examined: 3 ♂'s. Meadow, 3. July.

Bembix nubilipennis Cresson.

Specimens examined: 31 ♀'s, 5 ♂'s. Omaha, 5; Louisville, 3; Lincoln, 23; Fairmont, 2; Holdrege, 1; Culbertson, 1. July 9 to September 8.

Bembix sayi Cresson.

Specimens examined: 8 ♀'s, 19 ♂'s. Lincoln, 3; Fairmont, 1; Haigler, 2; Imperial, 4; North Platte, 1; Halsey, 1; Mitchell, 15. June 22 to August 17.

Bembix belfragei Cresson.

Specimens examined: 3 ♀'s, 3 ♂'s. Omaha, 1; West Point, 1; McCook, 2; Haigler, 1; Halsey, 1. June to August.

Bembix spinolæ Lepeletier.

Specimens examined: 219 ♀'s. Child's Point, 2; Omaha, 47; Louisville, 19; Lincoln, 16; Fairmont, 7; Cedar Bluffs, 1; South

Sioux City, 4; Niobrara, 1; Norfolk, 1; Neligh, 1; Red Cloud, 3; McCook, 1; Haigler, 3; Halsey, 5; Valentine, 2; Mitchell, 86; Glen, 12; Harrison, 3; Monroe Canyon, 5. June 18 to October 11.

Bembix primaestate Johnson and Rohwer.

Specimens examined: 12 ♀'s. Mitchell, 5; Glen, 5; Monroe Canyon, 1; Warbonnet Canyon, 1. July 11 to August 14.

Bembix pruinosa Fox.

Specimens examined: 11 ♀'s, 6 ♂'s. Child's Point, 1; Omaha, 6; Louisville, 2; South Bend, 1; Ashland, 5; Neligh, 2. July 2 to September 3.

Genus MICROBEMBIX Patton.

Microbembix monodonta (Say).

Specimens examined: 51 ♀'s, 23 ♂'s. Omaha, 15; Louisville, 5; South Bend, 13; Ashland, 27; Lincoln, 2; West Point, 2; Neligh, 3; Haigler, 1; Halsey, 1; Mitchell, 3; Gordon Creek, 1. June 18 to September 30.

A NEW SPECIES OF AGRILUS FROM CALIFORNIA.*

BY W. S. FISHER, BUREAU OF ENTOMOLOGY, WASHINGTON, D.C.

Among a collection of Buprestidæ, submitted by Mr. H. E. Burke for determinations, a large series of the following species was found, which has been confused in collections with *Agrilus politus* Say, and the description is presented at the present time, so that the name can be made available for discussing this species in economic papers.

Agrilus burkei, n. sp.

Form of *politus*, of a deep blue to bluish-green colour and moderately shining. Antennæ of a uniform blue or bluish-green throughout, rather short, not reaching to the middle of the prothorax, serrate from the fourth joint. Head nearly flat in front, with a shallow, transverse groove at base of clypeus, terminating in a deep pit just above the base of the antennæ, a feeble median depression reaching from the occiput to near the middle of the front; front coarsely granulate, sparsely clothed with short, white pubescence; occiput strigose. Prothorax wider than long, narrower at base than apex; sides arcuate, feebly sinuate near the posterior

*Contribution from the Branch of Forest Insects, Bureau of Entomology.
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angles, which are carinate in both sexes, sinuous when viewed laterally; disc convex with two shallow, median depressions, one near the base and the other near apex, and with deep, prominent lateral depressions; surface coarsely, transversely rugose, with fine, indistinct punctures between the strigæ. Scutellum transversely carinate, surface very finely granulate. Elytra slightly sinuate behind the humeri, dilated behind the middle, and slightly sinuate near the apex, which are separately rounded and serrulate; disc slightly flattened, basal impressions large and deep, reaching from the scutellum to humerus, surface closely imbricate-granulate, without any trace of costæ. Body beneath of same colour as above but more shining, finely, transversely strigose, and sparsely clothed with fine, short, white pubescence; prosternal lobe slightly emarginate; intercoxal process broad, slightly narrowing to apex. Pygidium without a projecting carina. First joint of hind tarsi as long as the next three joints united. Length 6-9 mm.; width 1.75-2.50 mm.

Male.—Front densely punctured and pubescent. Prosternum densely punctured and hairy. Claws of anterior and middle feet cleft near the apex, nearly bifid; posterior claws cleft at middle, forming a broad-tooth.

Female.—Front more shining and less densely pubescent. Prosternum sparsely pubescent. Claws of all feet cleft at middle, forming a tooth.

Habitat.—Placerville, California.

Type, allotype and paratypes.—Cat. No. 21386, U. S. N. M.

Described from a large series of specimens recorded under various Bureau of Entomology, Hopk. U. S. Numbers. These specimens have been reared by Mr. H. E. Burke from material collected at various times by himself, J. J. Sullivan and F. B. Herbert. The larvæ of this species mine in the inner bark and wood of normal, injured, and dying white alder (*Alnus rhombifolia*), and paperleaf alder (*Alnus tenuifolia*).

This species is closely allied to *politus* but differs from it chiefly in colour and habits. Horn in his Revision of the genus *Agrilus* (Trans. Amer. Ent. Soc., XVIII, p. 316, 1891) places all the brassy green or blue forms under LeConte's name *desertus*, which is preoccupied and which has been renamed *solitarius* by

Harold (Col. Hefte, vol. V, p. 124, 1869). LeConte in the original description, does not mention a blue form, but gives the colour as "aeneus subnitidus." Horn in the above Revision places all of these forms as synonyms of *politus* Say, in which he says, "The difference of colour has given rise to several names which do not seem worthy of retention, even as varietal names, inasmuch as the intergrading of colour is so gradual as to render it impossible to separate them." At the time Horn wrote his paper on this genus very little was known of their food habits, but as the habits of these insects become better known, and where large series have been reared, the colour seems to be quite constant, so it will be necessary to restore some of the old names.

TOM WILSON.

In the full vigour of his energetic life and while carrying out his duties as Inspector of Indian orchards, Mr. Tom Wilson was burnt to death on March 6th, 1917, when the Quahalla Hotel at Hope, B.C., was totally destroyed by fire.

Few men were more widely known or more universally liked in British Columbia than Tom Wilson, whose extensive knowledge of the natural history of the province, and particularly of the flora, was at the service of all students and nature lovers.

He was born at Mussleburgh, Scotland, on July 25th, 1856. As a young man he learned horticulture and forestry, and at the age of 22 was Foreman in the Royal Botanic Gardens, Edinburgh. Two years later he went to India where he spent six years. Repeated attacks of fever compelled him to return to Scotland, but in 1885, a few months after his return, he came to Canada. After a varied experience in railroad construction, farming and orchard planting he reached Vancouver, B.C., in 1896, and later was appointed as Fruit Inspector in the Provincial Department of Agriculture. In 1900 he was appointed Superintendent of Fumigation at Vancouver, B.C., by the Dominion Government, and in 1906 additional duties as Inspector of Indian Orchards were assigned to him. In 1911 he was relieved of his duties as Superintendent of Fumigation in order that he might devote his entire time to the work in the Indian orchards, an important section of the work of the Entomological Branch. To this work he devoted himself

wholeheartedly. At first his duties consisted in cleansing the Indian orchards, or one might say with greater exactness, the fruit trees on the Indian reserves in British Columbia. From this the work developed under his guidance until the Indians were not only growing excellent fruit but were learning to pack their fruit in the approved fashion, and in many reserves young orchards were being planted. Mr. Wilson wrote an account of the work in the Indian orchards in *The Agricultural Gazette of Canada*, October, 1916. (Vol. 3, No. 6, pp. 856-860.) The Indians and those gentle Sisters who teach the Indian children will miss him.

During his thirty odd years in British Columbia he acquired an extraordinary knowledge of the trees, plants and insects of the province, and long before the establishment of ecology as a special study he had especially interested himself in questions relating to plant distribution and association. He was always connected with the promotion of entomological work in British Columbia, and in 1912 was President of the Entomological Society of British Columbia, to the *Proceedings* of which he contributed papers from time to time. In conjunction with his friend A. H. Bush he made an excellent collection of the insects of British Columbia, and last year, after the death of his old friend on military service in France, he presented the collection to the Entomological Branch, where it now forms part of the Canadian national collection of insects.

He occupied a unique place in the small band of workers in British Columbia. His memory and his hands were at the service of all students of the subjects that he himself so diligently studied. Mountain, forest and the open country were his laboratory, and a journey in his company was a delightful experience. Nothing escaped his attention, and one felt the refreshing effect of a mind that had been stored in the open. His sister, in a recent letter to me, writes: "He enjoyed life so thoroughly lately, was so wholehearted in his pursuits that one did not think of him as in his 62nd year. His splendid constitution, the open air life and the intense love of his work, together with the close touch with nature, all combined to make the years pass lightly. . . ." His tragic death has removed a keen student of nature, a staunch friend and a faithful servant of the State.

C. GORDON HEWITT.

CLEANING BUMBLE-BEES.

Recently, when looking over some back numbers of the CAN. ENT. I came across Mr. Sladen's article on page 116 of vol. XLV, 1913, entitled "Bumble-Bees and Wasps Wanted." and noticed that in the second paragraph he says that "crushed tissue paper should be placed in the cyanide jar to absorb moisture which would otherwise mat and spoil the bees." As I have had some experience in the matter I thought perhaps a cure for this trouble might be of sufficient interest to warrant publication. Several years ago I visited a peach orchard in full bloom, and swarming with bumble-bees. I caught a nice lot of them and took them home, and when I came to pin them out I found that they were all as wet as the traditional "drowned rat," and apparently ruined. I decided to experiment with them; they couldn't be made to look any worse any way and perhaps might be bettered. I took a good-sized bottle with a wide mouth, filled it about half full of water, dumped the bees into it, corked it tightly, and shook it violently for several minutes. I then poured off the water and poured in more and shook again, repeating the process until the water seemed perfectly clean. I then spread the bees out on blotting paper and left them for a few minutes to get rid of the excess of the water, then put them back into the bottle and covered them with denatured alcohol, letting them stand until I thought the alcohol had had time to unite with the water, (perhaps 15 minutes) and then removed them again to fresh blotters to get rid of most of the alcohol, after which I again returned them to the bottle and flooded them with gasoline. After a few minutes in this bath they were again placed on blotting paper, and in a few minutes the gasoline all evaporated, and the bees were as fresh and clean as though never wet; cleaner in fact, for often fresh specimens are badly daubed with honey on the face and head. Possibly the last bath might not have been necessary, but it made them dry quicker. The same process would, I think, be equally successful in cleaning moths which have been drowned in sap buckets, only, of course, they should not be shaken in a bottle, but floated on a pan of water and moved around carefully to get rid of the sugar, just as the bees are freed of the regurgitated honey which is the cause of their being wet and sticky. —E. J. SMITH, Sherborn, Mass.

BOOK NOTICE.

PROCEEDINGS OF THE ENTOMOLOGICAL SOCIETY OF NOVA SCOTIA
FOR 1916. No. 2, January, 1917.

The Entomological Society of Nova Scotia deserves great credit for the admirable work it has already accomplished in the short period since it came into being. We have recently received a copy of vol. II of the Proceedings of the Society, containing the papers and addresses presented at the Annual Meeting, which was held at Truro on August 4, 1916. This is a publication of 64 pages, and contains in addition to excellent addresses by the President, Mr. E. C. Allen, and the Superintendent of Education, Dr. A. H. MacKay, thirteen papers on entomological subjects by various members of the Society. Of these papers no less than five are contributions from the Society's indefatigable Secretary-Treasurer, Prof. W. H. Brittain, the Provincial Entomologist, while two more are by the same author in collaboration with others. Mr. G. E. Sanders, of the Dominion Entomological Laboratory, Annapolis Royal, contributes four papers, including one in collaboration with Prof. Brittain.

The list of papers in addition to official reports and addresses is as follows:

"Some Results From a Few Combination Sprays," (W. H. Brittain); "How to Collect and Preserve Insects," (L. A. De Wolfe); "The Nova Scotia Division of Entomology," (W. H. Brittain); "The Effect of Certain Combinations of Spraying Materials on the Set of Apples," (G. E. Sanders); "The Acrididæ of Nova Scotia," (C. B. Gooderham); "The Apple Seed Chalcis," (W. H. Brittain); "Biting Insects Injuring the Fruit of the Apple in Nova Scotia," (G. E. Sanders); "Notes on two Species of Tree-hoppers," (W. H. Brittain); "Arsenate of Lead vs. Arsenate of Lime," (G. E. Sanders); "The Dock Sawfly," (A. G. Dunstan and F. C. Gilliatt); "Notes on the Rose Leaf-hopper," (W. H. Brittain and L. G. Saunders); "Notes on the Rosy Aphis," (W. H. Brittain); "The Toxic Value of Some Common Poisons," (G. E. Sanders and W. H. Brittain).

Mailed August 1st, 1917.



SOME RECENT IMMIGRANTS INTO NEW JERSEY.
(See page 293.)

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No. 9

POPULAR AND PRACTICAL ENTOMOLOGY.

UNDESIRABLE INSECT IMMIGRATION INTO NEW JERSEY.

BY HARRY B. WEISS, NEW JERSEY DEPARTMENT OF AGRICULTURE,
NEW BRUNSWICK, N.J.

From Europe, Asia and South America, a more or less constant stream of such undesirables arrives and settles in New Jersey. This State by reason of certain specialized agricultural activities, receives more than other States, but what is happening in New Jersey is happening to a less extent in other States. This emigration is not due to the pressure of over-population at home, nor to the pursuit of wealth, nor to political, social or religious discontent. It is rather an involuntary emigration or one of which the participants are wholly unconscious.

European officials try to keep them at home because they know that the United States does not want them, and a small army of inspectors on this side of the water is constantly on the watch for them, ready to turn them back if discovered; but in spite of the combined efforts of these officials, in spite of legislation against them, rules, regulations and so forth, some of these creatures contrive to slip through silently and unobserved, remaining so until later when their unwelcome activities are forced upon the community where they have settled.

On account of the similarity between the climate of this country and the northern parts of Europe and Asia and by reason of other similar conditions, many of these emigrants do very well in this country, especially when allowed to develop to their fullest extent unhampered by enemies and restrictions. One which is comparatively unimportant in its own country may become a serious menace when placed under new and favourable conditions. Fully one-half of the principal injurious hexapods in the United States have been introduced from foreign countries and the injuries inflicted by them have been enormous, in many cases beyond

reasonable calculation. In order to arrive at a better understanding of the facts surrounding these immigrants, a few cases are taken up in detail.

The Case of *Gryllotalpa gryllotalpa* (L.).

(Pl. XIV, fig. 2).

The Mole Cricket, *Gryllotalpa gryllotalpa* (L.), came to New Jersey from Holland, where with other members of her species, she occupied her time excavating tunnels through the soil, feeding on insect larvæ, cutting off plant roots in her path, raising a large family of children, eating them when other food was scarce, and incidently making a nuisance of herself to Holland agriculturists. One day while she and her husband were resting in a tunnel beneath a rhododendron growing in a nursery, the plant was suddenly dug up and before they could run, they found themselves imprisoned by a piece of burlap wrapped around the roots. Too frightened to try to escape, they dug a passageway for themselves in the closely packed soil and awaited developments.

This plant together with others was placed in a huge box which was floated down a canal in a flat-bottomed barge until an ocean-going steamer was reached. Here it was loaded none too gently into the hold of the vessel, which in due time docked at Hoboken, New Jersey. Following this, the case was loaded on a freight car and finally reached its destination in that state. Here the plant was removed, the burlap around the roots loosened, and the whole thing planted. Finding themselves free at last, Mr. and Mrs. *Gryllotalpa* crawled out to investigate and found conditions pretty much the same as they had been before their rough experience. So these two "shanghaied" creatures started a sub-way right then and there, and in due time raised another family. During the next few years they flourished exceedingly well, increasing in numbers by leaps and bounds, and finally cutting off so many roots that the plants wilted and died and the owner called in an entomologist to suggest a remedy.

And so ends the case of *Gryllotalpa*. Of course, the plants were officially inspected before the owner was allowed to plant them, but the inspector never thought of looking in the soil around the roots. If he did, he decided that it was not practical on ac-

count of the length of time necessary for such an operation, or because of the fact that the roots of the rhododendron were so fine and fibrous and so imbedded in the soil that it would be impossible to separate them and have anything left that would grow.

Some persons say that *Gryllotalpa* will never amount to much in New Jersey, which may be true, but what is to prevent her from being carried to other parts of the United States just as she was brought to New Jersey? Anyhow, she has a bad reputation in Europe.

The Case of *Blaberus discoidalis*.

(Pl. XIV, fig. 1).

Just like *Gryllotalpa*, the large Cockroach, *Blaberus*, came to New Jersey in a boat, but in this case, the boat sailed from a South American port instead of an European one. This boat carried among other things, numerous cases of wild orchids, which were consigned to a New Jersey orchid grower. It is somewhat difficult to determine just when *Blaberus* and his associates crawled into these cases and why they wanted to come to New Jersey. Perhaps they were chasing each other around the boxes while they stood on the dock of a South American port and a few dodged in to hide and were later carried on board. Perhaps they were already on the ship and crawled in the boxes for green food or want of something better to do or in search of amusement. However, these cases of orchids finally stood outside of a greenhouse in New Jersey waiting to be unpacked. This work was done outside so that *Blaberus* could not get into the house and thrive.

The official inspector was there also but *Blaberus* knew naught of inspectors and regulations and when the plant in which he was hiding was picked up, quick as a flash he dropped to the ground and scooted off. The greenhouse man said, "Well he will die just as soon as the weather gets cold, anyhow." Did he? Well, I guess not. Just as if an intelligent roach couldn't find a crack in a greenhouse, large enough to squeeze through. Then the inspector pulled out a little red book and marked down therein, "*Blaberus discoidalis* on orchids from South America." And that is all, except that *Blaberus* and others of his kind are doing very well now in New Jersey greenhouses. Of course, they are almost

omnivorous, are annoying, disgusting and troublesome, but still they don't bite the eyelashes off sleeping children here as they do in parts of Brazil, and that is something in their favour.

The Case of *Stephanitis pyrioides*.

It's a long distance from "cherry blossom" land to New Jersey, but the embryonic children of *Pyrioides* managed to make the trip in safety. *Stephanitis pyrioides* lived contentedly in Japan, on an azalea, sipping the sap now and then, watching over her brood, and taking pride in her beautiful, lace-like gauzy wings. Knowing upon the approach of cold weather, that she could not hope to live much longer, she carefully deposited in the leaves of the plant, close to the mid-ribs, tiny, oval eggs and then died contentedly. If this plant had only remained in Japan, all would have been well. But, there arose in New Jersey, a demand for Japanese azaleas, a demand which had to be supplied and so over the Pacific ocean, over the continent of North America, came the azaleas and the unborn children of *Stephanitis*. The inspector was on the watch for these plants and looked carefully over each one, but how was he to know of the tiny eggs hidden in the leaf tissue so effectually and not discoverable without a high-power microscope. He carried only a pocket lens, moreover he couldn't begin to pick off every leaf and tear it apart to see if anything was inside. The plants looked all right and so they were admitted.

And so the babies of *Stephanitis* grew up in New Jersey instead of Japan. Needless to say, they increased numerically to such an extent and made such a pest of themselves by sucking the sap out of nice, green, azalea leaves, that many owners of Japanese azaleas are forced every year to go through their gardens and squirt stuff on them with a little brass gun.

The Case of *Cholus forbesii*.

(Pl. XIV, fig. 3).

There lived in the tropical forests of Colombia, an attractive black and white-marked creature, which prowled around, sinking its beak into the leaves and bulbs of wild orchids growing on the trunks of trees, living a care-free life, unknown and unhonoured.

Some of the plants upon which it had bestowed its attention were later ripped from the trees by natives with long, sharp knives, and in the course of time finally came to grace the conservatory of a person whose aesthetic taste demanded orchids. It was only a question of time before *Cholus* made her appearance and started to feed on the scenery in that conservatory. It appears that she had smuggled either herself or her young along with the plants, undoubtedly in the tissue, which the inspector could not examine without destroying the plant, and in that way arrived safely at her destination.

Of course, the tropical atmosphere of a greenhouse does not approach that of her natural home but it is a fair substitute, and she can be contented provided the owner does not devote his attention to her extermination.

The foregoing cases, and it would be possible to cite numerous other ones, show how the insect fauna of New Jersey and other States is constantly being added to by undesirables from other countries. This immigration is taking place in spite of well-developed and well-enforced systems of inspection. The establishment of foreign pests in the United States is not always due to a laxity in the inspection service of any state. In most cases, the pests have entered undetected by the inspector, sometimes through his ignorance of foreign pests, sometimes on account of individual carelessness, but mostly on account of the impossibility of examining every leaf, twig, root and particle of soil around the roots of a plant and having anything left that will grow, especially when an inspector is called upon to examine hundreds of plants each day.

In other words, ordinary inspection will not keep out all foreign pests, and extraordinary inspection would not be tolerated by importing firms or paid for by state governments. The inspection does, however, prevent an overwhelming rush of such pests; it does hold and delay the spread of them at times until means of controlling them have been found or until they are no longer dangerous, and it has in the past served the country well; but it is useless to expect more from inspection however well carried out it may be.

The fact remains that by the importation of plants from foreign countries (64,652 cases were brought into the U. S. during the season of 1915-16, according to the report of the Fed. Hort. Bd. for year ending June 30, 1916) we are slowly but surely adding to the number of pests which we already have in this country, thereby increasing the burden which future generations will have to bear. And the remedy? A national quarantine of all foreign nursery stock.

EXPLANATION OF PLATE XIV.

Fig. 1, *Blaberus discoidalis*, a tropical roach (natural size).

Fig. 2, *Gryllotalpa gryllotalpa*, the European mole cricket (natural size.)

Fig. 3, *Cholus forbesii*, a tropical orchid weevil, (after H. S. Barber), (enlarged).

LECTOTYPES OF THE SPECIES OF HYMENOPTERA (EXCEPT APOIDEA) DESCRIBED BY ABBÉ PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

Introduction.

This paper, which is a contribution from the Branch of Cereal and Forage Insects and the Branch of Forest Insects, is largely based on an examination made in May and June, 1915, of the Provancher collections located in the Museum of Public Instruction at Quebec, and in the possession of Mr. W. Hague Harrington and the Department of Agriculture at Ottawa, Canada.

This study was undertaken in order to determine in so far as possible the correct position of the Provancher species in the modern classification and obtain notes which would supplement the original descriptions, and thus facilitate recognition of the species, many of which could not be certainly identified by the original description. Notes of greater or less extent were obtained on all but a few of the species of Hymenoptera, excluding the Apoidea, especial stress being laid, however, upon the sawflies and the parasitic forms belonging to the Ichneumonidea. In some groups our notes consisted principally of a record of the

condition of the type. The limited time at our disposal made it impossible to attempt to secure full notes on any but the groups in which we were especially interested.

This paper is only a list of the species described by Provancher with the location, condition and designation of the type specimens, and is submitted at this time in order to establish definite premises on which to work and thus make it possible to publish in the future, systematic notes on the species with assurance that other workers will be able to use our remarks and find the same specimens we examined.

The only previous comprehensive study of the Provancher collections was made by Mr. G. C. Davis, who has published the results of his study in two reports†. Davis, however, confined himself entirely to the Ichneumonidæ. The conclusions reached by him regarding the species, in the main, agree with our own, but in a number of instances do not coincide with ours. Davis made no attempt to establish lectotypes for the species, and, therefore, it was often impossible for us to determine on what specimen he based his conclusion.

Provancher's Life and Work.

Practically the first Canadian and in fact one of the first Americans to make a serious and comprehensive study of the Hymenoptera of Canada was Abbé Léon Provancher. Abbé Provancher was a French Canadian who was born, brought up and spent most of his life in the Province of Quebec. He died in 1892, and brief accounts of his life and work were afterward published in a number of journals.* Some years later Abbé Huard began a more extended biography which appeared in various issues of *Le Naturaliste Canadien*,** a magazine founded and edited, until shortly before his death, by Provancher. Since Provancher

†Some notes from a Study of the Provancher Collection of Ichneumonidæ, 1894, Proc. Acad. Nat. Sc. Phil., pp. 184-190.

Review of a few more Provancher types of Ichneumonidæ, 1895, Can. Ent., pp. 287-290.

*See especially Can. Ent., Vol. 24, 1892, pp. 130-131, and Entom. News, Vol. 6, 1895, p. 209, pl. IX.

**This interesting account has never been completed, but Abbé Huard told us it was his intention to complete it and we certainly hope he finds an opportunity to do so. For the parts published, see Nat. Can., 1894, 1895, 1896, 1897, 1898.

began his work in Quebec and spent most of his life there, it is not surprising to know that a large part of his collection came from that region. But later in his life he received much material from other people so that his completed collection included species from many parts of Canada, the United States, Europe and some of the West Indian Islands.

Provancher described about 923 species and a few genera of Hymenoptera and most of this great number are valid. His largest and most comprehensive work on Hymenoptera is *Petite Faune Entomologique du Canada* and its *Additions*, but besides this he published several shorter papers on Hymenoptera in which new species are described. Considering the time, lack of facilities and literature, and his comparative isolation, Provancher had a very good idea of the limits of a species. The weakest point of his hymenopterological work was his conception of genera and generic limits. Even when we consider the genera he recognized, we often find that he placed the same or closely allied species in widely different genera. Hence, we find, especially in the parasites, that Provancher was often wrong in his generic placement of the species. His descriptions are accurate, and if we remember that the diagnostic characters of that period were limited mostly to colour, they are as satisfactory as these of his contemporaries.

Location of Collections.

Most of Provancher's types are in the Public Museum of Quebec, some are in the collection of Mr. W. Hague Harrington at Ottawa, a few are in the collection of the Canadian Department of Agriculture at Ottawa, while a few others were returned to Ashmead and Cequllett and are now in the United States National Museum. Some few types we were unable to locate. These may have been returned to the collectors.

In 1889 the College de Levis, Levis, Quebec, received a collection of insects from Provancher, and for some time it was thought to contain some of his types. Further investigation tends to prove that this collection was composed entirely of duplicates, and in certain cases these were not correctly determined.

A—Collection in the Public Museum at Quebec.

The collection in the Museum of Natural History, under the

Department of Public Instruction is now housed in the Parliamentary Building in Quebec, and is cared for by Abbé V. A. Huard and his assistant. In this Museum there are really two Provancher collections. The first was purchased in 1877 by the Museum and is known as the 1877 collection (in this paper referred to as the first collection). The other came to the Museum (through purchase) after Provancher's death, and is known as the Dernière Provancher collection, (in this paper referred to as the second collection). Both of these collections are in the cabinets obtained from Provancher, and most fortunately are still left as arranged by him. Each collection contains species not represented in the other, but in cases where the species was found represented in both collections and there was nothing in the description or manuscript notes to prevent, we have chosen as lectotype a specimen from the second collection, because this was the collection retained and used by Provancher until his death, and we are inclined to believe, even though he was not a "type-worshipper," that he would retain the actual type for future reference. Specimens in both collections bear small, yellow labels on which a number is printed. These numbers are species numbers and refer to a catalogue prepared by Provancher. Each insect order in both collections begins with the number one. In the Hymenoptera, therefore, considering both collections as a unit, we often have two, usually widely different species under the same number. There appears to be no instance in which the same species occurs under the same number in both collections. The two collections differ in the style of name label. The name label for the 1877 collection is on blue paper, while that for the second collection is on white paper which has a double red line (the outer being the heavier) around the margin.

The catalogues prepared by Provancher are in the Public Museum, and although they are little more than lists of numbers followed by names, with an occasional mention of locality, they are of some assistance in proving the way in which Provancher treated species reduced by him to synonymy.

A hasty examination of all the insects in both collections showed that they were in remarkably fine condition, considering that they are kept in wooden drawers unprotected by any repellent,

and which are closed by glass tops which set down inside, without any overlapping flange. A careful examination of the Hymenoptera proved that they were free from pests and in good condition. At the time of our visit the Hymenoptera of the 1877 collection were in museum case 35, and those of the second collection in the left hand column of case 46 and two drawers in the left hand column of case 49.

That Provancher had no concrete idea of the value of types is shown by the fact that in no case (with possibly a few exceptions in later years) were his types labeled as such. Furthermore, it is apparent that when he discovered one of his species to be a synonym he often removed the name label from the type and pinned the specimen among others of the species to which he thought it belonged. In other instances, upon deciding that one of his species was synonymous with another not already represented in his collection he removed the original name label and replaced it with what he considered to be the correct one. For example, there is no specimen in his collections labeled *Selandria flavicornis*. After describing this species Provancher concluded that it was the same as *Selandria halcyon*, and an examination of the catalogue shows under 60 the name *Selandria flavicornis* with the word "*flavicornis*" crossed out and above it written the word "*halcyon*." It, therefore, appears certain that the type of *Selandria flavicornis* stands in the collection under the name *Selandria halcyon*. In this case this is also proven by the fact that Provancher instead of supplying a new label just reversed the old label and wrote the name *Selandria halcyon* so that we find on the underside of the label for *S. halcyon* the original label for *Selandria flavicornis*. This one case is sufficient to show how Provancher worked. Many other similar cases could be mentioned. There are many cases, however, where there is no proof, either in the catalogue or in the labeling, that the types of some of Provancher's species which were later suppressed by him stand under the name of the species with which he considered them to be synonymous. In such cases we can only assume, from our knowledge of Provancher's methods, that this is what has taken place.

At no time while studying the collection did we remove any labels, and we were always very careful to put the specimens

back where they came from so that the collection still stands as it was arranged by Provancher. We did not even feel justified in labeling the specimens which we believed to be the type as lectotypes, and will rely in this paper entirely on the name label and the number label for means of correctly identifying the specimens which we believe should stand as type.

* *B—Harrington Collection.*

The types in the Harrington collection are in good condition, and although they usually do not bear the name label in Provancher's writing we were assured by our friend Mr. W. H. Harrington that they were the identical specimens examined by Provancher as could easily be proven by a comparison of the number (they bear in addition to other labels a small, white square on which is written by Harrington a number) with the list as returned by Provancher.

C—Types in Collection of Canadian Department of Agriculture.

The types in the Department of Agriculture are in good condition, and have all been properly labeled as types.

D—Types in U. S. National Museum.

The types in the United States National Museum have all been accessioned and labeled with Museum type numbers.

Plan of Paper.

In submitting this list of the species described by Provancher and presenting notes on the location and condition of the types we have considered that it was much better to arrange them alphabetically as they appear in the final index published by Provancher as a conclusion to his two more important papers on Hymenoptera. We have chosen this method largely because there will be many more changes in generic position than those already published, and also because we do not know when we shall have an opportunity to completely review our notes and definitely assign the species of the genera as at present understood. Practically throughout this paper the word "type" is used in the sense of "lectotype." There are, however, certain cases when there was only one specimen, and there is no doubt that it is the specimen examined by Provancher and is, therefore, certainly the type.

At the time of our visit the type specimens of the species placed by Provancher in the Braconid subfamilies Aphidiinae and Opiinae were not available and the data on these were not secured. We hope, however, to secure and present it later.

Unless otherwise stated, it is to be understood that the specimens are in good condition. The letter (s) stands for the word "script." The numbers on the yellow labels are printed. Whenever possible, we chose as type the specimen which bore the name label written in Provancher's hand.

An Alphabetical List of Species With Designation of Lectotypes.

Acerota opaca. Type.—Yellow label 1381. 2nd Coll. Pub. Mus., Quebec. Two other specimens. Fair.

Acoenites canadensis. Type.—Male, yellow label 375. 2nd Coll. Pub. Mus., Quebec. Lacks antennae, right fore wing, hind tarsi, abdomen glued on.

Acoenites flavipes. Type.—Female, yellow label 1249. 2nd Coll. Pub. Mus., Quebec.

Acordulocera saginata. Type.—Yellow label 390. 2nd Coll. Pub. Mus., Quebec. Right fore wing gone.

Acothyreus mellipes. Type.—Yellow label 1320. 2nd Coll. Pub. Mus., Quebec. Fair.

Ægilips aciculatus. Type.—Not seen.

Agathis femorator. Type.—Female, yellow label 578. 2nd Coll. Pub. Mus., Quebec. Antennae wanting.

Agathis nigriceps. Type.—Female, yellow label 1680. 2nd Coll. Pub. Mus., Quebec.

Agathis perforator. Type.—Female, yellow label 577. 2nd Coll. Pub. Mus., Quebec.

Agathis quæditor. Type.—Female, yellow label 576. 2nd Coll. Pub. Mus., Quebec. Lacks head.

Agathis scrutator. Type.—Female, yellow label 1269. 2nd Coll. Pub. Mus., Quebec. Male allotype. Both glued on slips.

Agathis tibiator. Type.—Female, yellow label 579. 2nd Coll. Pub. Mus., Quebec.

Agenia atrata. Allotype.—Male, blue label 125(s). Yellow label 1417. 2nd Coll. Pub. Mus., Quebec.

Agenia perfecta. Type.—Male, yellow label 783. 2nd Coll. Pub. Mus., Quebec. Antennae wanting beyond 3rd joint. Four hind tibiae gone.

Agenia rufigastra. Type.—Female, blue label 122(s), yellow label 1419. 2nd Coll. Pub. Mus., Quebec.

Allantus cogitans. Type.—Female, yellow label 44. 2nd Coll. Pub. Mus., Quebec. Lacks right antenna. Two female paratypes. 1st Coll.

Allantus robustus. Type.—Female, Harrington Coll.

Allantus rubricus. Type.—Female, Harrington Coll. Lacks right antenna beyond 3rd joint.

Alomya pulchra. Type.—Not in Pub. Mus., Quebec, unless under name *Phygadeuon pubescens* Prov.

Alysia astigma. Type.—Female, yellow label 1051. 2nd Coll. Pub. Mus., Quebec. Left flagellum gone and only base of right remaining.

Same specimen used as type of *Aspilata astigma*.

Alysia completa. Type.—Female, yellow label 1166. 2nd Coll. Pub. Mus., Quebec.

Alysia fossulata. Type.—Cat. No. 1970, U. S. N. M.

Alysia lucens.—Type.—Female, yellow label 909. 2nd Coll. Pub. Mus., Quebec.

Alysia nigriceps. Type.—Female, yellow label 539. 2nd Coll. Pub. Mus., Quebec. Right flagellum and extreme apex of left gone.

Alysia rubriceps. Type.—Male, yellow label 1052. 2nd Coll. Pub. Mus., Quebec. Same specimen used as type of *Phænocarpa rubriceps* Prov.

Alyson conicus. Type.—Male, blue label 622(s), yellow label 1449. 2nd Coll. Pub. Mus., Quebec. Lacks most of left flagellum.

Alyson guignardi. Type.—Female, yellow label 1433. 2nd Coll. Pub. Mus.; Quebec.

Alyson triangulifer. Type.—Male, yellow label 1450. 2nd Coll. Pub. Mus., Quebec. Lacks apices of antennae.

Amblyopone binodosa. Type.—Yellow label 948. 2nd Coll. Pub. Mus., Quebec. Fair. (*Arotropus binodosa*).

Amblyteles bifasciatus. Type.—Yellow label 227. 1st Coll. Pub. Mus., Quebec.

Amblyteles borealis. Type.—Female, yellow label 1002. 2nd Coll. Pub. Mus., Quebec.

Amblyteles indistinctus. Type.—Female, yellow label 185. 2nd Coll. Pub. Mus., Quebec.

Amblyteles macrocephalus. Type.—Male, yellow label 1063. 2nd Coll. Pub. Mus., Quebec. Both antennæ broken, one at 1st flagellar joint, other at middle, 1 anterior, 1 median and 1 hind leg missing.

Amblyteles marginatus. Type.—Female, yellow label 700. 2nd Coll. Pub. Mus., Quebec.

Amblyteles perluctuosus. Type.—Female, yellow label 172. 2nd Coll. Pub. Mus., Quebec.

Amblyteles quebecensis. Type.—Yellow label 181. 2nd Coll. Pub. Mus., Quebec.

Amblyteles stadaconensis. Type.—Male, yellow label 175. 2nd Coll. Pub. Mus., Quebec.

Amblyteles superbus. Type.—Female, Harrington Coll.

Amblyteles tetricus. Type.—Female, yellow label 171. 2nd Coll. Pub. Mus., Quebec.

Anacharis marginata. Type.—Yellow label 1318. 2nd Coll. Pub. Mus., Quebec. Abdomen off but on triangle below.

Anacharis pediculata. Type.—Blue label 762(s), yellow label 1317. 2nd Coll. Pub. Mus., Quebec.

Anacharis subcompressa. Type.—White label "Quebec"; yellow label 616. 2nd Coll. Pub. Mus., Quebec. Abdomen gone.

Anacrabro constrictus. Type.—Male, tag-mounted, yellow label 1690. 2nd Coll. Pub. Mus., Quebec.

Anacrabro lævis. Type.—Female, yellow label 1691. 2nd Coll. Pub. Mus., Quebec.

Andricus gibbosus. Type.—Yellow label 609. 2nd Coll. Pub. Mus., Quebec. Head and abdomen gone. *Cynips* (*Andricus*) *gibbosa*—under *Cynips* in list.

Aneurychus foveatus. Type.—Blue label 83; yellow label 1330. 2nd Coll. Pub. Mus., Quebec. Fair.

Aneurychus mellipes. Type.—Yellow label 1331. 2nd Coll. Pub. Mus., Quebec.

Anomalon chlamidatum. Type.—Female, yellow label 1217. 2nd Coll. Pub. Mus., Quebec. Left antenna missing beyond fourth joint and right hind leg at coxa.

Anomalon exile. Type.—Female, yellow label 329. 1st Coll. Pub. Mus., Quebec. Left antenna at 15th joint, left median and both hind legs at coxæ gone; left fore wing gone and right broken at middle.

Anomalon filiforme. Type.—Female, yellow label 1218. 2nd Coll. Pub. Mus., Quebec.

Anomalon nigripennis. Type.—Probably pinned under *Exochilum mundum* Say. 1st Coll. Pub. Mus., Quebec.

Anomalon rufulum. Type and Allotype.—Harrington Coll. Both antennæ, tarsi, except one anterior, broken and lost. Female paratype yellow label 1213, blue label 481. 2nd Coll. Pub. Mus., Quebec.

Anomalon unicolor. Type.—Female, yellow label 1216. 2nd Coll. Pub. Mus., Quebec.

Apanteles acaudus. Type.—Female, yellow label 1285. 2nd Coll. Pub. Mus., Quebec.

Apanteles carpatus. Type.—Apparently destroyed. Pin bearing yellow label 592 in 2nd Coll. Pub. Mus., Quebec.

Apanteles clavatus. Type.—Female, yellow label 642. 2nd Coll. Pub. Mus., Quebec. Badly broken and plastered up with glue. Antennæ, one median and both hind legs gone. Specimen in U. S. N. M. labeled type not type.

Apanteles cinctus. Type.—Female, yellow label 716. 2nd Coll. Pub. Mus., Quebec. Antennæ broken near middle. Faun. 529. Add. S. 388.

Apanteles crassicornis. Type.—Female, yellow label 1269. 2nd Coll. Pub. Mus., Quebec. Antennæ and hind tarsi broken.

Apanteles femur-nigrum. Type.—Male, yellow label 1578. 2nd Coll. Pub. Mus., Quebec. One antenna broken, one front and one hind leg missing.

Apanteles longicornis. Type.—Female, yellow label 1258. 2nd Coll. Pub. Mus., Quebec.

Aphæreta auripes. Type.—Specimen in Public Mus., Quebec, bearing name label in Provancher's hand. Other data not taken. Specimen in U. S. N. M. labeled type, not type.

Aphidaria basilaris. Type.—See Introduction.

Aphidius canadensis. Type.—See Introduction.

Aphidius nigrovarius. Type.—See Introduction.

Aphidius obscurus. Type.—See Introduction.

Aplomerus tibialis. Type.—Female, Ent. Branch, Dept. Agr., Ottawa. Left antenna wanting beyond 5th joint.

Arenetra quebecensis. Type.—Not in Pub. Mus., Quebec, unless under *Lampronota tegularis*.

Arotes superbus. Type.—Not in Pub. Mus., Quebec, unless under name *A. vicinus* Cress.

Arotropus binodosus.—See *Amblyoponé*.

Ascogaster rufipes. Type.—Female, yellow label 1254. 2nd Coll. Pub. Mus., Quebec. Rather dirty. (This number in Prov. catalogue refers to *Chelonus rugulosus* Prov. There is no such species.

Aspilota astigma.—See *Alysia astigma*.

Atractodes autumnalis. Type.—Female, yellow label 706. 2nd Coll. Pub. Mus., Quebec.

Atractodes nigricoxus. Type.—Male, yellow label 984. 2nd Coll. Pub. Mus., Quebec. Left hind tarsus broken at 2nd joint.

Atractodes nitens. Type.—Male, yellow label 695. 2nd Coll. Pub. Mus., Quebec. Female not located in either collection.

Atractodes scaphiphorus. Type.—Yellow label 307. 2nd Coll. Pub. Mus., Quebec. Badly broken; only thorax, coxæ in part and wings, except right fore wing, remaining.

Aulacus bilobatus. Type.—Male, yellow label 82. 2nd Coll. Pub. Mus., Quebec. Left antenna gone.

(To be continued.)



LECANIUM CORNI (Fig. 1, 2, 3, 5 and 6) AND
PHYSOKERMES PICEÆ (Fig. 4),

OBSERVATIONS ON *LECANIUM CORNI* BOUCHE, and
PHYSOKERMES PICEÆ Schr.*

BY F. A. FENTON, COLUMBUS, O.

The following studies on the life history and habits of two of our common soft scale insects were made at Madison, Wisconsin, under the direction of Prof. J. G. Sanders. The writer is greatly indebted to Professor Sanders for invaluable assistance and to Mr. A. A. Girault for the determination of parasites.

THE EUROPEAN FRUIT *LECANIUM* (*Lecanium corni* Bouche).

Lecanium corni, probably native of Europe and one of our commonest and most widely distributed soft scales, has been the subject of much discussion in various scientific and popular journals. Sanders¹ has demonstrated that it is capable of much variation in form, size, and coloration even on the same host, and since it develops on numerous plants it is especially subject to a variety of normal environmental conditions. For instance, on hickory the ovipositing females are almost invariably white with black markings (Plate XV, fig. 2b), instead of the normal brown coloured forms (Plate XV, fig. 2a). Parasitism and disease produce abnormally developed forms, and these as well as immature individuals have been described as separate and distinct species.

History.—This insect was first reported in this country in 1851 when Fitch described it as *Lecanium tilia*². In 1859 it was found in Canada and in the United States as far west as Minnesota³, and in 1891 Crawford found it in large numbers in California⁴. Until 1908 there was much confusion regarding the identity of this species as its numerous synonyms indicate. It was found, however, that while external appearances might be extremely variable, certain microscopical characters remained constant, and Marchal⁵ and Sanders⁶ reduced to synonymy some forty so-called species, the form described by Bouche in 1844 as *Lecanium corni* having priority.

*Contributions from Entomological Department, University of Wisconsin.

1. Sanders, Jour. Ec. Ent., Vol. II, No. 6, pp. 443-445, 1909.

2. Fitch, 4th. Rep. Reg. Univ., N.Y., p. 69, 1859.

3. Fitch, 3rd Rep. Ins., N.Y., p. 50, 1859.

4. Crawford, Rep. Calif. Bd. Hort., p. 12, 1891.

5. Marchal, Ann. Soc. Ent. Fr., LXVII, p. 264, 1908.

6. Sanders, *loc. cit.*
September, 1917

Distribution and Economic Importance.—*Lecanium corni* is found throughout most of the United States and is known to occur as far north as Nova Scotia and Ontario, and south into Mexico. In spite of the wide range of its host plants and its general distribution this insect seldom becomes of economic importance, although serious outbreaks of it have been recorded. In 1891 Crawford⁷ reported its occurrence in California where it had become and still remains a serious pest of apricot and prune trees, and in 1894 Slingerland⁸ found a similar and doubtless the same species occurring in destructive abundance in the larger plum growing districts of New York.

Food Plants.—The European fruit lecanium, as already indicated, has been found on a wide variety of deciduous shrubs and trees, and it has received various popular names in different localities, according to its favorite host plant, being known in New York as the "plum scale," and in California as the "apricot scale". The following list gives an idea of the extent of its food plants.

<i>Aceraceæ</i>	<i>Acer macrophyllum</i>	
.....	" <i>negundo</i>	Box elder.
.....	" <i>saccharinum</i>	Soft maple.
.....	" <i>saccharum</i>	Sugar maple.
<i>Betulaceæ</i>	<i>Betula alba</i>	White birch.
.....	<i>Ostrya virginiana</i>	Hop hornbeam.
.....	<i>Corylus americana</i>	Hazelnut.
.....	" <i>rostrata</i>	Beaked hazelnut.
<i>Caprifoliaceæ</i>	<i>Viburnum pubescens</i>	Pursh.
<i>Celastraceæ</i>	<i>Evonymus sanguinea</i>	Evonymus.
<i>Compositæ</i>	<i>Grindelia</i> spp.	
<i>Cornaceæ</i>	<i>Cornus alternifolia</i>	
.....	" <i>sanguinea</i>	
<i>Ericaceæ</i>	<i>Vaccinium corymbosum</i>	High bush blueberry.
<i>Fagaceæ</i>	<i>Castanea dentata</i>	Chestnut.
.....	<i>Quercus palustris</i>	Pin oak.
.....	"	Laurel oak.

7. Crawford, *loc. cit.*

8. Slingerland, Cornell Exp. Sta. Bull. 83, 1894.

<i>Hamamelidaceæ</i>	<i>Liquidambar styraciflua</i>	Sweet gum.
<i>Juglandaceæ</i>	<i>Hicoria alba</i>	Shag-bark hickory.
	<i>Juglans cinerea</i>	Butternut.
	<i>" nigra</i>	Black walnut.
<i>Lauraceæ</i>	<i>Sassafras sassafras</i>	Sassafras.
<i>Leguminosæ</i>	<i>Cercis canadensis</i>	Red bud.
	<i>Gymnocladus dioica</i>	Kentucky coffee tree.
	<i>Gleditsia triacanthos</i>	Honey locust.
	<i>Robinia pseudacacid</i>	False acacia.
<i>Magnoliaceæ</i>	<i>Magnolia</i> spp.....	Magnolia.
<i>Oleaceæ</i>	<i>Fraxinus americana</i>	White ash.
	<i>Amelanchier canadensis</i>	Shad bush.
<i>Rosaceæ</i>	<i>Prunus armenacea</i>	Apricot.
	<i>" cerasus</i>	Cherry.
	<i>" domestica</i>	Plum.
	<i>" " galatensis</i>	Prune.
	<i>Pyrus communis</i>	Pear.
	<i>" malus</i>	Apple.
	<i>Rosa</i> spp.....	Rose.
	<i>Rubus</i> spp.....	Cultivated blackberry.
	<i>Rubus</i> spp.....	" raspberry.
<i>Salicaceæ</i>	<i>Populus</i> spp.....	Poplar.
	<i>Salix</i> spp.....	Willow.
<i>Saxifragaceæ</i>	<i>Ribes</i> spp.....	Currant.
		Gooseberry.
<i>Solanaceæ</i>	<i>Solanum dulcamara</i>	Climbing bittersweet.
<i>Tiliaceæ</i>	<i>Tilia americana</i>	Linden.
<i>Urticaceæ</i>	<i>Celtis occidentalis</i>	Hackberry.
	<i>Maclura pomifera</i>	Osage orange.
	<i>Morus rubra</i>	Red mulberry.
	<i>Ulmus americana</i>	American elm.
<i>Vitaceæ</i>	<i>Vitis</i> spp.....	Grape.

Life History.—*Lecanium corni* passes the winter in the second instar, the larvæ being found attached to the bark, generally preferring the underside of the branch and appearing as small, brown, flattened, oval bodies closely appressed to the surface. The appendages are withdrawn beneath the scale over which a thin, transparent, waxy covering is secreted.

Growth in spring is coincident with the beginning of sap flow, the insects seldom migrating, and within a week moulting for the second time. (Plate XV, fig. 5). Following this the male larva undergoes a series of transformations quite distinct from those of the female.

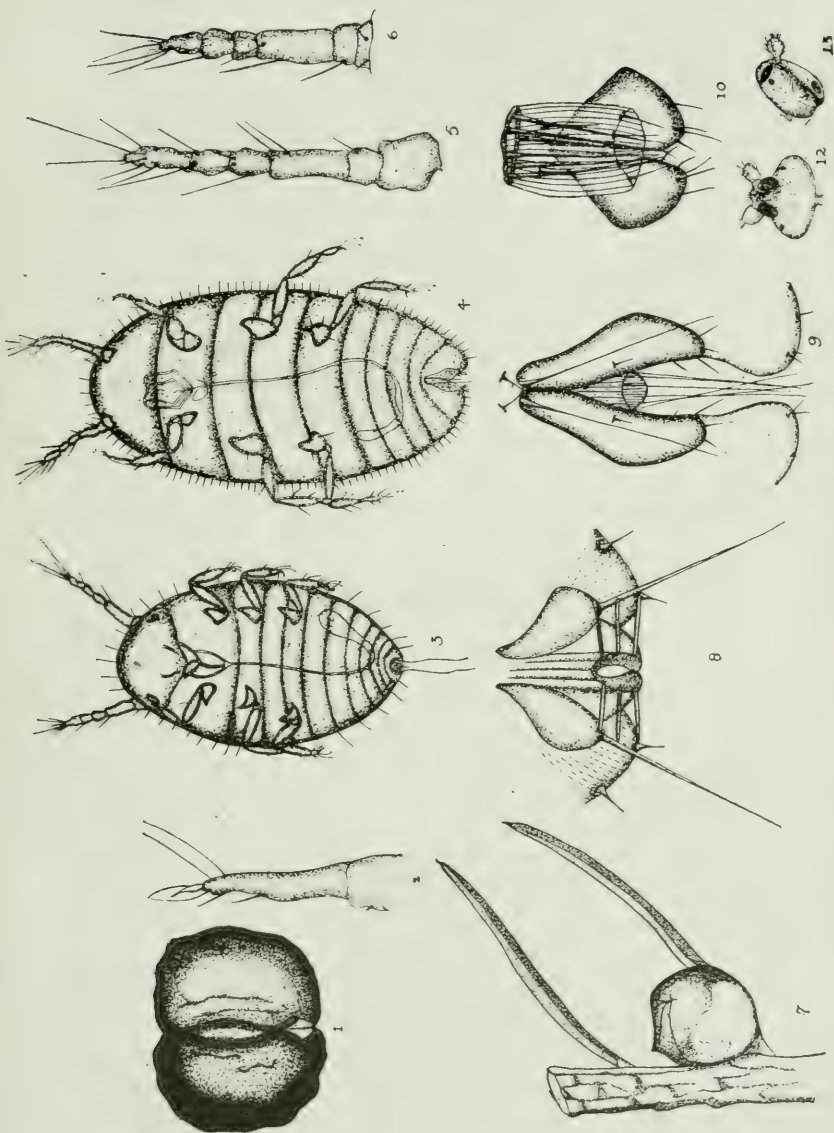
Male.—With the second moult the male enters a quiescent period known as the propupal stage during which no food is taken, and which is characterized externally by the beginning of a wax secretion over the scale or puparium which becomes separate from the insect. All larval appendages are cast off and are replaced by the developing legs and wings of the adult. This period is transitional, seldom extending more than two days.

The true pupa, which is flesh-coloured, may be easily seen beneath the opaque puparium, being distinguished only by the further development of its appendages and by the distinct segmentation of the body. Externally the secretion of wax has continued and the male scales differ from those of the females in their smaller size, more elongate shape, and wire-glassy appearance.

In from three to seven days the final moult of the male takes place within the puparium and is indicated by the wings and developing caudal filaments which often protrude beyond the scale. (Plate XV, fig. 6.) In a few hours after the last transformation the mature insect backs out from the puparium and is ready for flight. It is very delicate and lives but a few hours.

The emergence of the male generally covers a period of four weeks, the date of earliest emergence depending largely on the host species. The first males were bred out from scales collected on linden. They issued from the middle of April till the middle of May. On hickory and bittersweet males did not begin to emerge until the first of May and continued to mature until the middle of June. On elm and white ash they did not begin to issue until late in May, and the last individuals appeared late in June.

Female.—Following the second moult the female increases rapidly in size. Owing to the continued growth the protective wax covering is split and appears as irregular plates on the dorsum. These finally disappear and when mature the female is smooth, broadly oval, and slightly convex, with darker markings plainly visible on the lighter specimens. The comparative size with that of the male is indicated on Plate XV, fig. 1. Several stiff iridescent strands of wax project from the margin of the scale which may function as a secondary sexual character. Shortly after impregnation a chestnut or brown colour prevails, the surface becomes



PHYSOKERMES PICEAE (Figs. 1-9), AND *LECANIUM CORNI* (Figs. 10-13).

pitted and as growth continues, the body is arched upwards becoming quite convex.

In the latitude of Southern Wisconsin development continues with great rapidity during May and early June, the ovisac becoming distended with eggs. Within three weeks the females stop feeding and a week later oviposition commences. Scattered individuals begin egg laying by May 25 but the majority not until June 11. The eggs are deposited beneath the scale in a cavity or brood chamber formed by the shrinking ovisac, and this process continues until the venter becomes fused with the dorsum. At the end of egg laying the parent insect remains as a mere shell, which acts as a barrier against various egg predators and parasites.

The number of eggs laid by a single female varies considerably and over two thousand have been counted⁹. Small individuals may contain only a few hundred, but the average number is considerably over a thousand.

The oviposition period terminates by the middle of June, and eggs under observation on different hosts began to hatch during the first days of July, although in one exceptional instance one female was found to contain hatching young June 12. July 5 *Lecanium corni* was found hatching on ash, linden and apple, and a few days later on bittersweet. Practically all the young had issued by July 1 in spite of the fact that the dates of oviposition extended nearly a month. The young remain under the old scale until it becomes loosened, which is usually about five days from the time the first eggs hatch. This short period of rest is not essential to the life of the insect, and when a scale is removed from hatching young they immediately migrate to the leaves. They generally settle on the underside and when numerous attach themselves along the principal veins, where they remain until autumn.

Just before the leaves fall the immature scales migrate back to the bark, having moulted once. The percentage of those successful in re-establishing themselves in this way is not known, and it is possible that many are distributed to different hosts by the scattering of the leaves.

Description.—The eggs are oval, and protected by a powdery wax deposit, measuring .246 mm. by .112 mm. They are pure

9. Lowe, V. H., Rep. N. Y. State Exp. No. 14, 1895.

white when laid, but change to cream yellow previous to hatching.

The young larvæ measure .37 mm. in length and .135 mm. in width and are pale yellow, with eight distinct abdominal segments, but with no definite body divisions. The antennæ are short, six segmented, with numerous long setæ. Two anal plate spines are conspicuous, being about one-third the length of the body. After settling the insects assume a transparent green colour and are practically invisible on the surface of the leaf.

The second stage larva is distinguished microscopically from the first by the absence of the major apical setæ which disappear at the first moult. Upon migrating to the bark the green colour is replaced by brown. In this stage two sizes become differentiated, the larger measuring about one mm. in length, and the smaller .7 mm.

The puparium is a rather elongate oval structure 1.5 mm. in length and .75 mm. in width, the white, glassy colour sharply contrasting with the bark. It is slightly convex and is adorned by two longitudinal and two transverse whitelines. (Plate XV, fig. 6.) These scales are fragile and the empty ones are easily dislodged, seldom being found later in the season.

The adult male is a small, brown, two-winged insect $1\frac{1}{4}$ mm. in length, with a wing expanse of 4 mm. and having two long, white caudal filaments. The antennæ are relatively large, eight segmented, and densely clothed with hairs. The head is provided with six ocelli, one pair being located ventrally and two dorsally. (Plate XVI, figs. 12 and 13.) The wings are clouded with a tinge of brown and no halteres are present. There are six segments in the abdomen which terminates in a large style at either side of which are secreted the two long wax filaments.

At maturity the female is a smooth, brown hemisphere, and is incapable of locomotion, the appendages having been greatly outgrown by the swollen body which is fastened to the bark by a deposit of wax. (Plate XV, fig. 3.) Microscopically the anal plates (Plate XVI, fig. 10) are conspicuous and obtusely triangular, having eight anal ring setæ, four fringe, two sub-apical, and eight apical setæ. Fully mature females still possess the appendages though in an atrophied form, and may measure from 3 by 2 mm.

to 7 by 5 mm. During oviposition and accompanying the hardening of the derm, the latter becomes perforated with minute openings known as derm pores.

Experiments in host plant transfers.—A number of experiments were undertaken in view of definitely determining whether *Lecanium corni* could be transferred from one host plant to another, and the following table represents the results obtained.

TABLE I.—TRANSFER EXPERIMENTS WITH *LECANIUM CORNI*.

Original host	Number females used	Host transferred to	Date eggs hatched	Date larvæ attached	Number larvæ attached
White ash.....	3	pear	July 7	July 16	several
"	1	apple	"	"	"
"	1	elm	"	"	"
"	1	plum	"	"	"
"	2	sour cherry	"	"	"
Climbing bitter-sweet.....	several	apple	"	July 17	"
Elm.....	"	"	"	"	"
Linden.....	"	"	"	"	"
Kentucky coffee tree.....	"	"	"	"	"
Pear.....	"	"	"	"	"
Plum.....	"	"	"	"	"
Black locust.....	"	"	"	"	"
Plum.....	"	pear	"	"	"
Linden.....	"	"	"	"	"
Elm.....	"	"	"	"	"
Linden.....	"	currant	"	"	"
Ash.....	"	plum	unsuccessful		
Bittersweet.....	"	"	"		
Linden	"	ash	"		
Maple.....	"	shag bark hickory	"		

It will be observed that in several instances unsuccessful attempts were made to transfer *Lecanium corni*, but this was due to either parasitism or dislodgement of the females.

Parasites.—The following species of Chalcidoidea were bred from *corni*, which on some trees was badly parasitized and almost exterminated—*Coccophagus lecanii* Le Baron var., *C. cinguliventris* Gir., *C. perflavus* Gir. mss., *Blastothrix longipennis* How., and several male encyrtids. Besides these parasites, *Comys bicolor* How., *Coccophagus lecanii* Fitch, *Euderus lividus* Ashm., and *Aphicus albiceps* Ashm., have been bred from this scale in Michigan.¹⁰ By far the most numerous and effective one in this region proved to be *C. lecanii*, although in California *Comys fusca* How., a species not found at Madison, and probably not occurring in Wisconsin, seems to be the chief check.

Predators.—The maggots of a small fly, *Leucopsis nigricornis* Egger, were observed feeding on the eggs. Two common coccinellid beetles *Hyperaspis binotata* Say, and *Chilocorus bivulnerus* Mulsant, are important enemies, the larvæ feeding on the eggs and young.

Disease.—The adult females are susceptible to several fungous diseases, which with favourable conditions, spread rapidly and destroy many of the insects. *Cordyceps clavulatum* Ellis is the most important of these and was first mentioned as being parasitic on *Lecanium corni* by Pettit in 1895.¹¹

THE SPRUCE SCALE, (*Physokermes piceæ* Schr.).

Physokermes piceæ Schr. is found abundantly on the Norway spruce (*Picea abies*) about the University of Wisconsin campus, and has become a serious pest of this tree. It is especially numerous on the lower branches, many of which are being killed by it, and which are rendered unsightly by a black fungus thriving on the honey-dew secreted by these insects. The heavy honey-dew secretion is also very attractive to flies, and especially honey bees.

History and Distribution.—In 1903 *Physokermes piceæ* was believed to be confined to Europe,¹² and it was not reported in this country until 1906 when it was discovered near Hartford, Connecticut. Since then it has been found in various northern localities as far west as Wisconsin. The following list of American records of its distribution was kindly furnished by Mr. E. R. Sasser, of Washington, D.C., Massachusetts.

10. Lowe, V. H., *loc. cit.*, p. 589.

11. Pettit, R. H., Cornell Exp. Sta. Bull., 97, p. 341, 1895.

12. Fernald, M. E., Mass. Exp. Sta. Bull., No. 88, p. 209, 1903.

Massachusetts				
Amherst.....	<i>Picea abies</i>	June 9, 1908.....	B. N. Gates.	
".....	" <i>menziesii</i>	" 8, 1910.....	"	
Malden.....	" ".....	May 25, 1908.....	W. T. Harris.	
Hanover.....	<i>Pinus strobus</i>	Oct. 19, 1912.....	J. W. Hinckley.	
Connecticut				
Hartford.....	<i>Picea abies</i>	June 23, 1906.....	W. H. Patton.	
New Hampshire				
Pike.....	<i>Picea rubens</i>	" 3, 1909.....	E. J. Kraus.	
New York				
Yonkers.....	<i>Picea</i> spp.....	" 15, 1912.....	W. L. Kingman.	
Pennsylvania				
West Chester.....	<i>Picea menziesii</i>	Nov. 28, 1914.....	F. Windle.	
Ontario				
Guelph.....	<i>Picea</i> spp.....	July 14, 1910.....	T. D. Jarvis.	

It is thus an introduced species from Europe, and is dependent on spruce and pine as host plants. It in fact seems to prefer the Norway Spruce *Picea abies*, being found on no other tree in Madison, Wisconsin, although in some instances the infestation was surrounded by different species of spruce.

Life History.—In winter the second stage larvæ are found clustered thickly on the undersides of the spruce needles. They remain dormant until the latter part of March, when they become active and may be observed migrating from one branch to another. This period of spring activity is of short duration and by April the majority have settled on the leaves.

By the middle of April those larvæ which are to develop into females migrate to the twigs. The male larvæ remain attached to the undersides of the needles, where they moult twice during a period of development in which the insect passes successively from a propupal to a true pupal stage beneath the first exuvia which becomes coated with wax.¹³ The adult males issue within two weeks after the twigward migration of the females and fertilization takes place by the first of May, shortly following the second moult of the females.

Female.—The majority of the female larvæ settle in the woody bracts at the bases of the smaller twigs. In this stage growth is at first slow, and tendril-like wax filaments are secreted around the margin of the scale. In two weeks the insects moult for the second and last time, all appendages being lost, a mere globular sac resulting. This change takes place early in May,

13. Henschel, Die Schadl. Forst. and Obst. Ins., p. 511, 1895.

practically all larvæ being in the last instar by May 3. In this month growth is rapid, the females maturing by the first of June. Specimens dissected May 29 were found to contain fully developed eggs.

Oviposition began June 9 at which time large quantities of the honey-dew persisted. As the eggs are deposited the internal structures of the female shrink until the body organs become obliterated and persist as a thin septum dividing the egg chamber into halves. During the development of the insect, the anal cleft lengthens, due to the great enlargement of the body wall, until it comes to lie dorsally. Thus at the end of oviposition the female remains as a hollow sphere, divided internally into two cells closely packed with eggs, the number of which varies from only 12 in small individuals to as many as 227, the average being about 200.

The period of incubation extends for a month and larvæ were observed hatching July 27. At this time they are entirely surrounded by the body wall of the dead female, the anal cleft being entirely closed; but within a week, the mechanical drying and shrinking of the derm causes the cleft to split apart, producing an opening through which the young can pass. The larvæ immediately migrate to the spruce needles upon which they settle, growing slowly and moulting once before autumn.

Description.—The eggs are .4 mm. by .24 mm. and are smooth, ovate and pink in colour. The hatching young (Plate XVI, fig. 3.) are small, red, lice-like insects .5 mm. in length. Microscopically the antennæ are six-segmented, (Plate XVI, fig. 6), and the anal plate is well defined, having the usual major apical setæ, (Plate XVI, fig. 8). No spiracular spines are present in this species although found in others of this genus.

There is little difference between the two larval stages except that microscopically the anal plates are further developed, (Plate XVI, fig. 9). Just preceding the second moult the larva is about 1 mm. in length, (Plate XVI, fig. 4).

The adult female is a brown sphere, averaging from 1.5 mm. to 3 mm. in diameter, (Plate XVI, fig. 3). It presents a very curious appearance when alive, capped with a large transparent viscid globule of honey dew, and clothed basally with a thin sheath of white wax, (Plate XV, fig. 4). During life the body wall is plastic

and adapts itself to the irregularities in the bark, but upon maturing it becomes heavily chitinized and extremely rigid.

The old dead female shells are generally found at the juncture of the twigs in groups of from two to as many as eight. They are of a chestnut brown colour, closely resembling buds, and are dislodged with difficulty, often remaining attached to the bark for several years. Microscopically few structures are visible, the appendages and anal plate having been lost with the second moult.

Parasites.—A parasite seems to have been introduced with the species from Europe and is effective in checking the spread of the scale. This was determined to be a new species and was recently described by Girault as *Holcencyrtus physokermis*. *Cheiloneurus albigornis* How., and several encyrtids were bred from this insect.

A NEW CANADIAN NOCTUID.

BY WM. BARNES, M.D. AND J. MCDUNNOUGH, PH.D.
DECATUR, ILL.

Xylomoia chagnoni, sp. nov.

♂.—Antennæ finely ciliate; head and thorax light ruddy brown, the collar crossed by a black line; abdomen untufted, light ochreous; primaries rather pale ruddy-brown with the maculation not well defined, the most conspicuous feature being a black dash in the sub-median fold connecting the t. a. and t. p. lines; sub-basal line very obscure, angled below costa; t. a. line better defined, faintly geminate, the inner line more or less obsolete, the outer black, with a prominent outward angle below vein 1, preceded by a slight dark shade along inner margin; orbicular and reniform very faint, rather small, the former oblique, the latter defined on its inner edge by a black lunate mark; claviform scarcely visible resting on the black streak in the fold; t. p. line faint; strongly bent out around cell, then rigidly inwardly oblique to vein 1 where it bends outward slightly to inner margin, it is followed by a few dark points on the veins; s. t. line pale, obscure, irregular, defined outwardly by two darker terminal semi-triangular patches, the

one at inner angle, the other between veins 4-6; a rather heavy terminal broken black line; veins terminally slightly paler than ground colour; fringes smoky, cut by a median dark line and dotted with ochreous opposite veins. Secondaries pale shiny ochreous, shaded with smoky terminally, with large, dark discal dot and distinct wavy post-median line; a broken, dark, terminal line and a median line through pale fringes. Beneath smoky with slight ruddy tinge and paler secondaries; dark discal dots and terminal lines on both wings but post-median line of secondaries less distinct than on upper side. Expanse 30 mm.

Habitat.—Rouville Co., Que., (July 4); Mt. St. Hilaire, Que., (July 4, 6). 3 ♂'s. Type, Coll. Barnes. Paratype, Coll. Chagnon.

We have much pleasure in naming this species after Mr. G. Chagnon, of Montreal, from whom we received the type specimens. The species bears considerable superficial resemblance to *Xylomoia didonea* Sm. from Colorado, but lacks among other things the distinct white-marked t. p. line as well as showing a well-defined post-median line on secondaries; the front is rather improminent, being slightly less bulging than in *didonea* but the species resembles so markedly the figure of the generic type, *Xylomoia graminea* Staud., figured in Rom. Mem. VI, Pl. 12, fig. 8, that we incline to place it in this genus. We have single worn specimens of this new species from Cartwright, Man., and Durango, Colo., which would indicate an extended distribution.

AN ANNOTATED LIST OF THE SCOLYTID BEETLES OF OREGON.

BY W. J. CHAMBERLIN, OREGON EXPERIMENT STATION,
CORVALLIS, ORE.

Conophthorus ponderosæ Hopk.

There are a number of specimens in the College Collection taken at Corvallis, Oregon, Dec. 17, 1909.

Conophthorus, sp.

Three adults bred from cones of *Pinus contorta* collected at Corvallis, Oregon. Oct. 29, 1915.

Cryphalus amabilis, n. sp.

Length.—Female, 1.6 mm.; male 1.2 mm. Body oblong,
September, 1917

elliptical, dark brown, almost black; pronotum slightly broader than long, broadest just before the base, constricted sharply at base so as to be slightly narrower than the base of elytra; pronotum rounded, hood-shaped, anterior margin with two distinct teeth near the apex, an obscure tooth lateral to each; pronotum with prominent callosities arranged in six or seven, more or less concentric circles; spaces between callosities with minute elevations, elytra finely and densely punctured; striae plainly seen but appear as mere lines of enlarged punctures. Entire body covered with fine yellowish hair, short on elytra, longer and coarser on pronotum; ventral surface and legs clothed with medium long yellowish hairs.

Described from seven specimens, four males and three females taken at Elk Lake, Oregon, August, 1914, Host Amabilis Fir (*Abies amabilis*).

A small stand of Amabilis Fir (*Abies amabilis*) saplings was noted near Elk Lake at an elevation of 3,300 feet. The trees looked sickly and the foliage on many branches was turning red. Upon examination a tiny entrance hole was found just below many of the branches, and a small, oval chamber was eaten out. These chambers averaged from $\frac{1}{8}$ to $\frac{1}{4}$ inch across the longest diameter and from 20 to 35 eggs were deposited therein, mingled with fine bark borings. The eggs were slightly over $\frac{1}{2}$ mm. long and $\frac{1}{4}$ mm. wide, oval, transparent and white. The larvæ when first emerged are about the size of the egg and grow very slowly for some days. They develop to slightly over $2\frac{1}{4}$ mm. long, but never become very active. The pupæ are from $1\frac{3}{4}$ to 2 mm. in length and $\frac{1}{2}$ to $\frac{3}{4}$ mm. broad. The pupal cells are in the cambium.

Eggs are deposited the last week in August and hatch in 5 days; the slightly yellowish larvæ work out in all directions from the egg chamber, girdling the small limbs and covering a space of 5 or 6 square inches. Though not definitely established, it is very probable that each pair of beetles make more than one egg chamber. Both male and female work at excavating the egg chamber.

Cryphalus subconcentralis Hopk.

Astoria, Oregon. May 24, 1899. Hubbard & Schwarz.

Cryphalus grandis, n. sp.

Length 1.8 mm.; width 0.8 mm.

Body size and shape of *C. amabilis*; colour black. Pronotum with four teeth on the anterior margin, two central teeth large, rounded, lateral ones narrower, smaller. Dorsal surface rather densely clothed with pale hairs. First two lines of callosities on the pronotum regular, posterior portion more or less confused. The entire dorsal surface presents a granulate appearance, a condition not noted in any other species. Striae faintly evident, especially laterally; elytra sparsely clothed with long, bristle-like hairs. Faint transverse rugulae on the elytra. Elytra clothed with fine hairs (not scale-like) and finely obscurely punctate. Legs amber coloured, antennal club dark. Ventral surface clothed with recumbent, yellowish hairs. Lateral margin of the elytra shows a very broad emargination near the middle, and a distinct ridge extends from the humeri to the posterior lateral margin of the elytra. (Not constant.)

A large number of specimens from *Abies grandis* near Corvallis, Oregon, collected by the author. Hairs on pronotum dense, medium long, recumbent toward anterior margin; bristle-like hairs of dorsal surface very long.

Crypturgus, undes. sp.

A number of these minute insects were taken from a dead fir (*Abies lasiocarpa*) near Sumpter, Oregon, July 20, 1914. In company with other bark beetles, they were working in the dead bark near the top of the tree.

Dendroctonus valens Lec.

Rather common throughout the pine regions of the State. Especially abundant in *Pinus ponderosa* in Eastern and Central Oregon. Occasionally found at the base of the larger lodgepole pines (*P. contorta*). Noted at Corvallis, Hood River, Bend, Crescent, Sumpter, Sparta, Ashland and on the Klamath Indian Reservation. The habits of the *Dendroctonus* beetles are too well known to deserve comment here.

Dendroctonus monticolæ Hopk.

Found throughout the State in *Pinus ponderosa*, *contorta*, *monticola* and *lambertiana*, wherever these trees occur. It has caused heavy losses in Northeastern, Central and Southern Oregon.

Dendroctonus engelmanni Hopk.

This species has not heretofore been reported (in literature) from this State. The author collected two dead adults from their characteristic mines under the bark of *Picea engelmanni* near Sumpter, in the Blue Mountain Region of Northeastern Oregon.

Dendroctonus brevicornis Lec.

This is the most serious pest of pine in this State, and causes the death of a very large amount of the largest and finest yellow pine (*P. ponderosa*) timber of Eastern, Central and Southern Oregon. Thousands of dollars are being expended annually in combating the pest.

Dendroctonus pseudotsugæ Hopk.

Found in all parts of the State where Douglas fir grows. The beetles seem to prefer dying, injured or down timber, but will attack living, healthy trees as shown by a serious infestation in Southern Washington and near White Pine, Oregon, where several thousand trees were killed.

Dendroctonus obesus Mannh.

A rather rare beetle working in the cambium of Sitka spruce, *Picea sitchensis*, noted at Marshfield and Astoria.

Dendroctonus jeffreyi Hopk.

This species is reported by Dr. Hopkins as occurring in Southwestern Oregon. I have seen no specimens collected in this State.

Dolurgus pumilus Mannh.

Oregon (Swaine 1908) in *Picea sitchensis*.

Dryocoetes autographus Ratz.

A number of specimens referred to this species were collected near Detroit, Oregon, from the bark of large Douglas fir windfalls.

Dryocoetes pseudotsugæ Swaine.

This species is not uncommon in the western part of the State. At Ranier the adults were found in January, crowded into hibernation galleries in the outer bark of Douglas fir. In December near Olney they were found under the bark of a Douglas fir stump, when the bark was removed, the larvæ were found to be actually floating in water. Specimens brought into the laboratory matured, thus showing that they have adapted themselves to the extremely wet winters of that section. Also noted at Corvallis and Detroit, Oregon.

Eccoptogaster unispinosus Lec.

A species widely distributed in the State, works in Larch (*Larix occidentalis*), Douglas fir (*Pseudotsuga taxifolia*), and Engelmann Spruce (*Picea engelmanni*). It is not uncommon in the thin bark of Douglas fir saplings, and limbs of older trees. It was recently bred from thick bark taken from near the base of a large tree, here the species evidently spent its full life cycle in the bark never reaching the cambium. It often causes the death of saplings and young poles.

Eccoptogaster, n. sp.

A species resembling *unispinosus* in size and form but differing in the spines was taken in numbers from the twigs of a dying Grand fir (*Abies grandis*) at Corvallis, in September, 1916.

Eccoptogaster subscaber Lec.

Found throughout the State working in *Abies*, especially *A. grandis*. The adult makes a short transverse gallery from 1 to 3 inches long, 30 to 50 eggs are deposited, and the larvæ work up and down the tree. (They are doing considerable damage at Klamath Lake in white firs). These larval mines are often a foot long; the pupal cells may be wholly in the bark, wholly in the wood, or partly in each. It is not unusual to find a tree so heavily attacked that it would be impossible to find a square inch free from mines. Larva, pupa and adults were taken at Ashland, Oregon, June 21, 1916.

Gnathotrichus sulcatus Lec.

Common in dying trees, especially in the western portions of the State. This ambrosia beetle has been taken from *Abies grandis*, *A. nobilis*, *Pseudotsuga taxifolia* and *Tsuga heterophylla*. Noted at Corvallis, Detroit, Astoria, and in the Blue Mountain Region.

Gnathotrichus retusus Lec.

A similar species found in *Tsuga heterophylla*, *Pinus contorta*, *P. ponderosa* and *Pseudotsuga taxifolia*. Most abundant in the Coast Range and Blue Mountains.

Gnathotrichus sp.

A species which I am unable to place among the described species was taken from Alder (*Alnus oregona*) at Florence, Oregon, in April, 1914.

Gnathotrichus sp.

A species similar to the last was taken from a healthy maple (*Acer macrophyllum*) at Corvallis, Oregon, in May, 1916.

Hylastinus obscurus Mannh.

The common clover root-borer is found in both Eastern and Western Oregon.

Hylesinus aculeatus Say.

Not abundant but is found attacking *Fraxinus oregona* in the western valleys. The work of this beetle often presents a masterpiece of wood engraving. The adult and larval mines are often as perfect and symmetrical as if done by the hand of an expert engraver.

Hylesinus aspericollis Lec.

A rather common species attacking living and dying alder (*Alnus oregona*). It usually selects young trees, but in the late summer of 1914 the author collected a number of adults from newly made burrows on large limbs of old trees near Breitenbush Hot Springs, Oregon. They worked in pairs, each helping in the excavation. In August many of the burrows were just being started. Noted at Florence and Corvallis, Oregon.

Hylesinus granulatus Lec.

Collected from *Abies grandis* in Blue Mountains of Oregon, in July, 1914.

Hylesinus dentatus Lec.

Rare, found in *Juniperus occidentalis*.

Hylesinus imperialis Lec.

Rare, Corvallis, May and September.

Hylurgops rugipennis Mannh.

Large numbers of these beetles were collected under the bark of a large, dead white pine (*Pinus monticola*) in the Santiam National Forest. August 21, 1914.

Hylurgops subcostulatus Mannh.

A decidedly secondary pest, entering dying or dead *Pinus ponderosa* after other Scolytids have started their work, occurring in large numbers at times. They were found especially numerous in the yellow pine of the Blue Mountain Region.

Hylurgops lecontei Swaine.

A species similar to *subcostulatus* occurring in yellow and lodge-

pole pine in the eastern portion of the State, and in the coast variety of *Pinus contorta* near the mouth of the Siuslaw River.

Hylurgops pinifex Fitch.

Reported from Oregon by Dr. Leconte.

Ips. emarginatus Lec.

These large *Ipidæ* attack the cambium of the lower and middle trunk of *Pinus ponderosa* and *P. contorta*. They excavate large mines, running parallel with the grain of the wood, often cutting through the mines of *D. valens*, *monticola*, and *brevicomis* with which they associate. As a rule the mines are nearly straight, but at times they wind around considerably without any particular pattern. Larvæ of all stages, together with adults were collected in the Blue Mountains during June and July. They attack living, dying and recently dead trees, both standing and fallen.

Ips, n. sp.

A species allied to Leconte's *balsameus* was collected from dead *Pinus ponderosa* at Hood River, in August, by Mr. LeRoy Childs. The tree had been dead at least two years. The *Ips* galleries were so cut by galleries of other beetles that it was almost impossible to get the design.

Ips latidens Lec.

Collected from *Pinus ponderosa* on Boundry Creek, Grant County, Oregon, June, 1914.

Ips radiata Hopk.

Not uncommon in *Pinus contorta* and *P. ponderosa* in the Blue Mountain Region of Eastern Oregon.

Ips rectus Lec.

I have not been able to identify this species in any of the material collected, but it is reported from Oregon by Dr. Leconte.

Ips wieslanderi Swaine.

Collected under the bark of drying lodgepole pine (*P. contorta*) in the Whitman National Forest in July, 1914.

Ips oregona Hopk.

Large numbers of these beetles were found at Bend and Ashland attacking living, dying and recently felled yellow pine, showing a decided preference for the latter. More than one pair of adults are often found in the same gallery. Adults and eggs

were common at Bend, May 19, while larvæ and pupæ were found at Ashland, June 20. Many were found dead, imbedded in pitch on the stumps. The egg galleries are usually 7 to 8 inches long, though it is not uncommon to find them 12 to 18 inches or even more in length. These galleries are usually fairly straight, running parallel with the grain of the wood. Occasionally they are irregular, crossing and recrossing other galleries, making a complex pattern. The typical work consists of an irregular round chamber, about half an inch in diameter from which the egg galleries run up or down the tree trunk. Each female has her own gallery in which 20 to 40 eggs are deposited along the sides and carefully covered with fine borings.

Ips pini Lec.

Reported from Oregon by Leconte in 1868.

Ips interruptus Mannh.

A single specimen taken from *Picea sitchensis* at Marshfield, Oregon.

Ips interpunctatus Eich.

Collected from *Pinus contorta* on the Whitman National Forest in July, 1914.

Ips concinnus Mannh.

This species ordinarily attacks *Pinus contorta* and *Picea sitchensis*, and it was very unusual to take several adults from a fire-injured Douglas fir sapling at Astoria in April, 1915. This is probably an accidental host, and it is interesting to note that the broods failed to develop.

Ips cælatus var.

Collected from *Picea engelmanni*, Grant County, Oregon, June, 1914.

Ips confusus Lec.

Occurs in the extreme southern part of the State in pine.

Leperisinus aculeatus Lec.

A single specimen collected at Corvallis. Host not known.

Orthotomicus ornatus Swaine.

A few specimens taken from *Pinus ponderosa* on the Whitman National Forest, July, 1914.

(To be continued.)

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POPULAR AND PRACTICAL ENTOMOLOGY.

THE APPLE MAGGOT IN BRITISH COLUMBIA.

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Two adult flies of the Apple Maggot or Railroad Worm, (*Rhagoletis pomonella* Walsh) were taken at Penticton, B.C., by the author on July 26th, 1916. Inasmuch as this record constitutes the first of its kind for the Province of British Columbia, and exists practically as an original record for the Pacific Coast of North America, it is of interest and of importance. I am indebted to Dr. J. M. Aldrich for his final determination of the species.

On July 26th, 1916, while visiting the orchards in the flat land lying between Okanagan Lake and Dog Lake, at a point about two miles south of Penticton, B.C., I was attracted by the appearance of some trees suffering from a pathological trouble (Baldwin Spot). While standing among the trees in the orchard I noted an adult Trypetid fly settle on a leaf. The specimen was captured in a hand net, and examination showed a strange resemblance to the Apple Maggot (*R. pomonella*). I was so struck by the resemblance that I endeavored to find other specimens. After an hour's search I was only rewarded by capturing a second adult.

The flies were later referred to Dr. C. Gordon Hewitt, who concurred as to their identity, but who suggested that they be forwarded to Dr. Aldrich for final determination. Dr. Aldrich duly certified to the fact that the specimens were adults of the Apple Maggot, *R. pomonella*.

The variety of apple tree upon which the flies were taken was the Red Astrachan variety, but examination of its fruits and the fruits of other early varieties in the vicinity, on July 26th and on a subsequent occasion in August, revealed no definite sign of larval

injury. Many early varieties of apple had been picked and shipped at the time of the second examination. Consequently this fact, coupled with the lateness of the season which was towards the end of the flight period of the adults, probably accounts for the paucity of material.

So far as the distribution of this species of fly on the Pacific coast is concerned, I am indebted to Dr. J. M. Aldrich and to Mr. Henry H. Severin for drawing my attention to some of the following records: Five specimens were collected by Mr. O. T. Baron, in the southern part of the State of California. These were described by Snow as *Rhagoletis zephyria*, n. sp., (Kansas Univ. Quart., II, No. 3, pp. 164-165) in 1894. R. W. Doane, in 1898 (Ent. News, IX, p. 69), and J. M. Aldrich in 1909, (Can. Ent., XLI, p. 69) state that *R. zephyria* is a synonym of *R. pomonella*. Since the record of 1894, apparently, no further remarks on its existence have been made in California. Dr. Aldrich further states, in correspondence, that his cards show that the insect has been recorded from the eastern slope of Colorado (Colorado Springs, Fort Collins). No information is available that the species exists in the State of Oregon, but Dr. A. L. Melander (Bull. No. 103, Wash. Agr. Exp. Sta., Dec. 1911) states that it "has been recorded as destructive along the eastern border" of the State of Washington. He remarks, however, that there is no positive evidence of its occurrence in Washington orchards.

Consequently the record for British Columbia stands very nearly as a unique one for the Pacific Coast. Fortunately it evidently does not exist in numbers at present in British Columbia, otherwise its presence would have been observed on earlier occasions. Even yet no definite form of larval injury has been observed, and the record, thus far, exists only in the form of the capture of two adult flies. It is interesting to note, however, that Mr. E. H. Strickland, Field Officer, Entomological Branch, Dominion Department of Agriculture, captured a single specimen of this fly at Lethbridge, Alta., in 1914. There is little doubt that the insect emerged from imported fruit, and as the Province of Alberta is supplied more commonly with western fruit than eastern, the record suggests an interesting probability.

LECTOTYPES OF THE SPECIES OF HYMENOPTERA
(EXCEPT APOIDEA) DESCRIBED BY ABBÉ
PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

(Continued from page 308.)

Bæoneura arietina. Type.—Yellow label 1380. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Banchus caudatus. Type.—Female, yellow label 1298. 2nd Coll. Pub. Mus., Quebec.

Banchus ferrugineus. Type.—Yellow label 385. 1st Coll. Pub. Mus., Quebec.

Banchus flavovariegatus. Type.—Female, yellow label 311. 2nd Coll. Pub. Mus., Quebec. Female, yellow label 379. 1st Coll. 2 other specimens.

Banchus formidabilis. Type.—Yellow label 378. 2nd Coll. Pub. Mus., Quebec. Antennæ at apex, median tarsi at apex, right hind tarsi entirely, gone.

Banchus inermis. Type.—Female, yellow label 313. 2nd Coll. Pub. Mus., Quebec. 3 specimens in 1st Coll.

Banchus insignis. Type.—Male, yellow label 387. 1st Coll. Pub. Mus., Quebec. Right anterior tarsus, left median tarsus at 2nd joint, left hind tarsus and right at metatarsus, right median leg, broken off.

Banchus pallescens. Type.—Male, yellow label 386. 1st Coll. Pub. Mus., Quebec. Left antenna at 5th joint, left fore leg and right hind leg gone.

Banchus polychromus. Type.—Female, yellow label 1551. 2nd Coll. Pub. Mus., Quebec.

Basalys ruficornis. Type.—Yellow label 913. 2nd Coll. Pub. Mus., Quebec.

Bassus aciculatus. Type.—Female, yellow label 1565. 2nd Coll. Pub. Mus., Quebec. Lacks most of antennæ.

Bassus albicornis. Type.—Not in Pub. Mus., Quebec. unless under name, *B. orbitalis* Cress.

Bassus amœnus. Type.—Not in Pub. Mus., Quebec, unless under name, *B. orbitalis* Cress.

Bassus areolatus. Type.—Not in Pub. Mus., Quebec, unless under name, *Lampronota punctulata* Cress.

Bassus auriculatus. Type.—Not located.

Bassus belangeri. Type.—Female, yellow label 709. 2nd Coll. Pub. Mus., Quebec.

Bassus bouleti. Type.—Not in Pub. Mus., Quebec, unless under name, *Erronemus pedialis* Cress.

Bassus cingulatus. Type.—Female, yellow label 985. 2nd Coll. Pub. Mus., Quebec.

Bassus costalis. Type.—Female, yellow label 453. 2nd Coll. Pub. Mus., Quebec. Some legs gone.

Bassus cylindricus. Type.—Male, yellow label 103(s) and 1246 (Prov.) 2nd Coll. Pub. Mus., Quebec. Lacks left antenna.

Bassus dorsalis. Type.—Female, blue label 195(s); yellow label 1247. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone.

Bassus elongatus. Type.—Male, yellow label 694. 2nd Coll. Pub. Mus., Quebec.

Bassus fuscitarsus. Type.—Male, yellow label 349. 2nd Coll. Pub. Mus., Quebec.

Bassus humeralis. Type.—? yellow label 448. 1st Coll. Pub. Mus., Quebec. Abdomen wanting. Sex not determined. One male, yellow label 348, same species, in 2nd Coll. Species described from one female.

Bassus ichneumonoides. Type.—Species badly confused, impossible to choose lectotype.

Bassus longicornis. Type.—Yellow label 932. 2nd Coll. Pub. Mus., Quebec.

Bassus mellipes. Type.—Female, yellow label 1656. 2nd Coll. Pub. Mus., Quebec. Badly mounted, antennæ gone.

Bassus pallipennis. Type.—Female, yellow label 1021. 2nd Coll. Pub. Mus., Quebec.

Bassus pectoralis. Type.—Yellow label 449. 1st Coll. Pub. Mus., Quebec. Lacks abdomen and antennæ.

Bassus pulchripes. Type.—Male, yellow label 446. 1st Coll. Pub. Mus., Quebec. Lacks apex of right antenna.

Bassus saginatus. Type.—Female, yellow label 533. 2nd Coll. Pub. Mus., Quebec.

Bassus scapulatus. Type.—Female, yellow label 994. 2nd Coll. Pub. Mus., Quebec.

Blacus cuneatus. Type.—Female, yellow label 1592. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tip.

Blacus defectuosus. Type.—Female, yellow label 1287, blue label 734. 2nd Coll. Pub. Mus., Quebec. Antennæ broken about 10th joint.

Blacus longicaudus. Type.—Yellow label 1282, blue label 710. 2nd Coll. Pub. Mus., Quebec. Head and fore legs missing.

Blennocampa paupera.—See *Selandria*.

Blepharipus cinctipes. Type.—Male, yellow label 957. 2nd Coll. Pub. Mus., Quebec.

Blepharipus nigricornis. Type.—Male, yellow label 1448. 2nd Coll. Pub. Mus., Quebec.

Brachistes crassigaster.—See *Calyptus*.

Brachistes submucronatus.—See *Calyptus*.

Bracon æqualis. Type.—Female, yellow label 551. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone.

Bracon angelesius. Type.—Female, blue label K(s), white label 25(s), yellow label 1486. Head and wings except left hind wing, gone.

Bracon apicatus. Type.—Female, yellow label 554. 2nd Coll. Pub. Mus., Quebec. Lacks ovipositor, apices of antennæ and some tarsi.

Bracon auripes. Type.—Female, blue label 670, yellow label 1571. 2nd Coll. Pub. Mus., Quebec. Right wings and head gone.

Bracon inquisitor. Type.—Female, yellow label 536. 2nd Coll. Pub. Mus., Quebec. Lacks flagella and right wings.

Bracon lævis. Type.—Female, yellow label 537. 2nd Coll. Pub. Mus., Quebec. Lacks flagella and left wings.

Bracon longicaudis. Type.—Yellow label 602. 2nd Coll. Pub. Mus., Quebec. Two specimens on same pin, top one female lacks antennæ, other one probably male, lacks abdomen and part of antennæ.

Bracon lutus. Type.—Yellow label 552. 2nd Coll. Pub. Mus., Quebec.

Bracon nanus. Type.—Female, yellow label 725. 2nd Coll. Pub. Mus., Quebec.

Bracon nigripectus. Type.—Female, yellow label 553. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone.

Bracon nigripes. Type.—Female, yellow label 1261. 2nd Coll. Pub. Mus., Quebec.

Bracon nitidus. Type.—Male not in Coll. Female, allotype, yellow label 1026. 2nd Coll. Pub. Mus., Quebec. Female, paratype, yellow label 104. 2nd Coll. Pub. Mus., Quebec.

Bracon obliquus. Type.—Female, yellow label 541. 2nd Coll. Pub. Mus., Quebec. Dirty.

Bracon ornatus.—See *Iphiaulax*.

Bracon pilosipes.—Type.—Male, yellow label 1655, (also round, faded orange disk). 2nd Coll. Pub. Mus., Quebec.

Bracon politus. Type.—Cat. No. 1969, U. S. N. M.

Bracon pygmæus. Type.—Female, mica tag, yellow label 555. 2nd Coll. Pub. Mus., Quebec.

Bracon rufovariegatus. Type.—Male, yellow label 605. 2nd Coll. Pub. Mus., Quebec. Female allotype without label.

Bracon sanguineus. Type.—Cat. No. 1968, U. S. N. M.

Bracon striatus. Type.—Male, yellow label 724. 2nd Coll. Pub. Mus., Quebec.

Callimome fagopirum. Type.—Yellow label 917. 2nd Coll. Pub. Mus., Quebec. Fair.

Callimome longicauda. Type.—Yellow label 1019. 2nd Coll. Pub. Mus., Quebec. Fair.

Calyptus crassigaster. Type.—Female, yellow label 1300. 2nd Coll. Pub. Mus., Quebec. Dirty.

Calyptus submucronatus. Allotype.—Female, yellow label 569. 2nd Coll. Pub. Mus., Quebec. Antennæ missing. Type male not located.

Campoplex carinatus. Type.—Female, yellow label 294. 2nd Coll. Pub. Mus., Quebec.

Campoplex flavipennis. Type.—Not in Pub. Mus., Quebec, unless under *Ophcletes glaucopterus* Linn. Three specimens 2nd Coll., 2 in 1st Coll.

Campoplex lucens.—See *Mesoleptus*.

Campoplex luctuosus. Type.—Female, yellow label 335. 1st Coll. Pub. Mus., Quebec. Head and left fore leg entirely gone.

Campoplex marginatus.—See *Limnerium*.

Campoplex minor. Type.—Female, yellow label 293. 2nd Coll. Pub. Mus., Quebec. Antennæ gone.

Campoplex niger. Type.—Female, yellow label 1220. 2nd Coll. Pub. Mus., Quebec. Badly broken.

Campoplex nigripes. Type.—Not in Pub. Mus., Quebec, unless under *C. laticinctus* Cress. Female, 2nd Coll., female 1st Coll.

Campoplex politus.—See *Exolytus*.

Campoplex scalarius. Type.—Female, yellow label 1219. 2nd Coll. Pub. Mus., Quebec.

Campoplex semirufus. Type.—Female, yellow label 1024. 2nd Coll. Pub. Mus. Quebec. Antennæ, one at scape, the left at 3rd joint, middle tarsi at 2nd joint, right hind tarsus and last joint of left hind tarsus gone; abdomen broken off, stuck on pin below specimen. Allotype not located.

Campoplex unicolor.—See *Mesoleptus uniformis* Prov.

Campoplex vicinus. Type.—Female, yellow label 291. 2nd Coll. Pub. Mus., Quebec.

Camptotera clavata. Type.—Not at present in Coll. Sent to Girault, June, 1911.

Capitonus rubriceps. Type.—Female, blue label 721(s), yellow label 1279. 2nd Coll. Pub. Mus., Quebec.

Capitonus rugosus. Type.—Female Cat. No. 21433 U.S. N.M. Lacks fore wings and antennæ. Male, allotype, blue label 606, yellow label 1255. 2nd Coll. Pub. Mus., Quebec. Lacks apex of left antenna.

Centeterus tuberculifrons. Type.—Female, yellow label 249. 1st Coll. Pub. Mus., Quebec. Some verdigris.

Cephus bicinctus.—See *Phyllæcus*.

Cephus interruptus. Type.—Female, yellow label 1542. 2nd Coll. Pub. Mus., Quebec. Head gone.

Ceratosoma rufus. Type.—Female, yellow label 377. 1st Coll. Pub. Mus., Quebec. Antennæ broken at apex.

Cerceris æqualis. Type.—Cat. No. 1974 U. S. N. M.

Ceropales minima. Type.—Male, blue label 124(s), yellow label 1420. 2nd Coll. Pub. Mus., Quebec.

Ceropales superba. Type.—Harrington Coll. Paratype, yellow label 766. 2nd Coll. Pub. Mus., Quebec.

Ceroptres dorsalis. Type.—White label 56; white label 71(s); yellow label 1595. 2nd Coll. Pub. Mus., Quebec.

Charitopus facialis. Type.—Harrington Coll.

Charops fuscipennis. Type.—Female, Cat. No. 1967 U. S. Nat. Mus. Right antenna broken; right hind tarsi gone; right wings glued on label.

Chelonus argentifrons. Type.—Male, yellow label 1304. 2nd Coll. Pub. Mus., Quebec. Apices of antennae gone.

Chelonus basicinctus. Type.—Female, yellow label 906. 2nd Coll. Pub. Mus., Quebec. Left flagellum and apex of right gone.

Chelonus carinatus. Type.—Female, yellow label 907. 2nd Coll. Pub. Mus. Quebec., Apex of left antenna gone. Specimen rather dirty.

Chelonus fissus. Type.—Male, yellow label 598. 2nd Coll. Pub. Mus., Quebec.

Chelonus nanus. Type.—Male, yellow label 908. 2nd Coll. Pub. Mus., Quebec.

Chelonus rufiscapus. Type.—Female, yellow label 1303. 2nd Coll. Pub. Mus., Quebec.

Chiloneurus maculatipennis. Type.—Harrington Coll.

Chorinaeus pulchripes. Type.—Female, yellow label 1025. 2nd Coll. Pub. Mus., Quebec.

Chrysis aurichalcea. Type.—Not located.

Chrysocharis viridis. Type.—Harrington Coll. Fair.

Cinctus nasutus. Type.—Blue label 769; yellow label 1328. 2nd Coll. Pub. Mus., Quebec.

Cleonymus superbus. Type.—Yellow label 1601. 2nd Coll. Pub. Mus., Quebec. Fair.

Cleptes americana. (preoc.) = *provancheri* Aaron. Type.—Not in Quebec. May be in Philadelphia.

Clistopyga canadensis. Type.—Female, yellow label 396. 2nd Coll. Pub. Mus., Quebec.

Clistopyga truncata. Type.—Female, yellow label 1001. 2nd Coll. Pub. Mus., Quebec.

(To be continued.)

NEW NORTH AMERICAN SPECIES OF DOLICHOPODIDÆ
(DIPTERA).

BY M. C. VAN DUZEE, BUFFALO, N. Y.

***Sympycnus fasciventris*, n. sp.**

Runs in the table of species in the Entomological News, Vol. 24, p. 270 to No. 10 where it would form a third item which would read: "Whole of hind tibiae and base of hind tarsi yellowish."

Male.—Length 3 mm. Eyes meeting on the face, leaving only a long, slender triangle below the antennae which is covered with white pollen; palpi small, whitish; front wide, brown, covered with gray pollen; cilia of the lower orbits short, black; antennae (Fig. 28, A) black, first and second joints short and with the usual bristles at tip of second joint, the longest about equal to the length of the joint; third joint fully as long as the first two together, triangular, with a sharp point, about twice as long as the width at base, fringed with rather long, crooked hairs; arista inserted near the base, pubescent, nearly twice as long as the antennae; eyes pubescent. Thorax rather pale brown with grayish pollen,

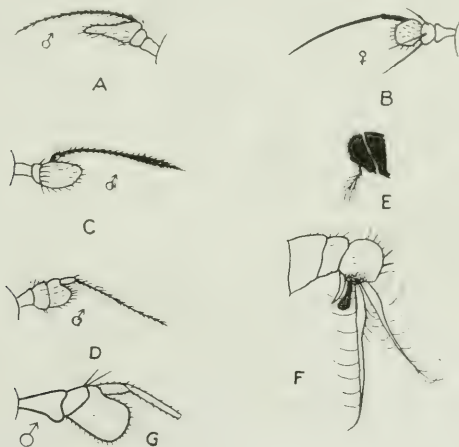


Fig. 28—A. *Sympycnus fasciventris* sp. nov., antenna of male.
 B. *Nothosympycnus inornatus* sp. nov., antenna of female.
 C. *Nothosympycnus inornatus* sp. nov., antenna of male.
 D. *Sympycnus caudatus* sp. nov., antenna of male.
 E. *Sympycnus lineatus* Loew, hypopygium.
 F. *Sympycnus caudatus* sp. nov., hypopygium.
 G. *Nothosympycnus abbreviatus* sp. nov., antenna.

which is thickest on the pleuræ, sides of the dorsum and space before the scutellum; scutellum slightly darker than the dorsum, and with two strong bristles inserted at the sides. Abdomen bronze brown, shining, with the apical half of segments three to six pale verdigris-green, first and second segments of the same colour on the sides, the green nearly meeting on the dorsum of the second along the hind margin; venter dark brown, paler towards the base; hairs of the abdomen black except a few on the sides of the first and second segments; hypopygium small, forming a rounded tip to the abdomen and without visible appendages. Fore coxæ yellow with abundant, rather long, pale hairs on the front surface; middle and hind coxæ black with yellow tips, hind pair with a pale bristle and two pale hairs on the outer surface, middle pair with pale hairs. Legs yellow; hind femora darker above; fore tarsi short, scarcely as long as their tibiæ, darkened towards the apex, last two joints black; fore pulvilli enlarged; middle tarsi slender, a little longer than their tibiæ; middle tibiæ with two bristles near the base and one near apical third; hind tarsi stout, infuscated from the tip of the second joint, about four-fifths as long as their tibiæ, first and second joints subequal. Halteres and tegulæ pale yellow, tegular cilia pale. Wings grayish hyaline with the fourth vein ending in the apex of the wing.

Described from a single male taken at Fulton, St. Cruz Mts., Cal., (300 feet), May, by Dr. J. C. Bradley.

Type in the Cornell University collection.

The wings in the type are in very poor condition. The species can easily be recognized by the slender third antennal joint, small hypopygium with its small appendages, and the colour of the feet.

***Sympycnus caudatus*, n. sp.**

Runs in the keys to N. Am. species to *S. lineatus* Loew, but is distinguished by the longer hypopygial appendages, colour of the thorax and the modified fore tarsi. (Fig. 28, E, *lineatus*; F, *caudatus*.)

Male.—Length 2-3 mm. Eyes meeting so as to obliterate the face; antennæ (Fig. 28, D) small, first and second joints yellowish, third joint black, slightly pointed, scarcely as long as wide; arista dorsal, inserted near the base of the third joint, rather long and

slender, pubescent; front and thorax bronze brown, shining, slightly dulled with brown pollen; pleuræ with whitish pollen. Abdomen dark bronze brown with more or less purple reflections towards the tip; venter yellowish, which colour extends more or less to the dorsum at the base; hypopygium brown, rounded and conspicuous, with minute white pubescence and a few black bristles; outer appendages long yellow filaments which are ciliate with long hairs placed at regular intervals (F), inner appendages black, club-shaped. Fore coxæ yellow, nearly bare but with a few bristles near the tip; middle and hind coxæ black with the extreme tips yellow; legs yellow; last three joints of fore and hind tarsi and the middle tarsi from the tip of the first joint infuscated; hind femora more or less darkened at the tip; first joint of fore tarsi about as long as the remaining four and with several bristles towards the tip, second joint longer than any of the following, enlarged below, last three joints of nearly equal length, third joint contracted at base; fore pulvilli not enlarged; middle tarsi slender, about one and one-half times as long as their tibiae; first joint distinctly shorter than the four remaining joints together; first joint of hind tarsi shorter than the second. Halteres yellow; cilia of the tegulae pale. Wings brownish hyaline; fourth vein ending in the apex of the wing.

Described from six males from Wild Cat Canyon, San Pablo, Contra Costa Co., Cal., taken Nov. 16th by J. C. Bradley.

Type in the Cornell University collection.

***Sympycnus canadensis*, n. sp.**

Male.—Length 2 mm., length of wing the same. Face silvery white, black just below the antennæ, rather wide for a male, narrowed below; palpi brown; front almost black with violet reflections, shining; antennæ black, third joint triangular, as long as the width at base; arista dorsal, pubescent. Thoracic dorsum violet in the centre, more coppery on the sides with considerable brown pollen on the front sides, and with a large, velvety black spot on each side above and in front of the root of the wings, the sloping posterior portion and the scutellum bright green; pleuræ blackish with gray pollen. Abdomen dark green, shining, with the venter and most of the second and third segments yellow,

clothed with pale hairs; hypopygium small, black with small, black lamellæ. Coxæ and legs yellow; top edge of hind femora on apical half, hind tibiæ and tarsi wholly and last two joints of fore and middle tarsi black; fore coxæ with prominent black bristles on the front surface; middle and hind coxæ each with a large, black bristle on the outer side; fore tibiæ with a bristle on top near the base and several small ones; middle and hind tibiæ each with two bristles on top, one at basal fourth and one near the middle, and several at tip; fore tarsi a little longer than their tibiæ, the first joint nearly as long as the remaining four together, second a little longer than the third, fourth and fifth about equal in length; pulvilli not at all enlarged; middle tarsi as long as their tibiæ; hind tarsi shorter than their tibiæ, the first joint very little shorter than the second. Tegulæ, their cilia and the halteres yellow. Wings grayish hyaline, rather dark; fourth vein ending in the apex of the wing; posterior cross-vein nearly three times its length from the tip of the fifth vein; veins black.

Described from two males which I took at Ft. Erie, Ont., June 6th. Type in the author's collection.

This species would run in the table of species in the Ent. News, Vol. 24, p. 270, to *S. angustipennis* Ald., but that species has yellow antennæ, yellow appendages to the hypopygium, and has the legs and feet entirely yellow except the last tarsal joint.

Nothosympycnus inornatus, n. sp.

Male.—Length 2.5–3 mm. Face very narrow, covered with gray pollen; front and thorax metallic brown with a greenish lustre and dulled with yellowish brown pollen; antennæ (Fig. 28,C) black, third joint large, oval, rounded at tip; arista inserted near the base of the third joint and thickened towards the apex, pubescent; scutellum blue-green. Abdomen shining black on the dorsum, especially towards the apex; venter yellow, which colour extends more or less to the dorsum at the base; hypopygium small, black, its appendages inconspicuous. Fore coxæ yellow with yellow hairs towards their tips; hind coxæ with a pale bristle on the outer side. Legs yellow, hind femora and tibiæ darkened at tips; tarsi becoming black towards their tips; first joint of fore tarsi very short, not much longer than thick, second joint three-

fourths as long as the tibiae and nearly as long as the third and fourth together, third and fourth of equal length, fifth distinctly shorter than fourth; middle tibiae with several slender bristles (the specimens before me have from one to four, they seem to be easily broken off); middle tarsi about as long as their tibiae, the first joint longer than the remaining four, second nearly as long as the three following and distinctly widened at tip, third and fourth about equal in length and somewhat widened, fifth slender, nearly as long as the preceding two together; hind tarsi scarcely as long as their tibiae. Tegulae, their cilia, and the halteres yellow. Wings brownish hyaline; fourth vein ends in the apex of the wing; anal angle prominent.

Female.—Face wide; thorax more opaque brown; third antennal joint (Fig. 28,B) smaller, about as long as broad, rounded at tip; middle tibiae with several bristles as in the male.

Described from seven males and several females taken by J. C. Bradley, in Wild Cat Cn., San Pablo, Contra Costa Co., Cal., May 20th–25th.

This is very much like *vegetus* Wheeler but the thickening of the arista is not close to the tip as in that species, nor so conspicuous; the relative lengths of the joints of the fore tarsi are also different, and the anal angle of the wing is more prominent.

Nothosympycnus abbreviatus, n. sp.

Male.—Length 3 mm. Face narrow with silvery white pollen; palpi yellowish; proboscis brown; front bluish but thickly covered with brown pollen so as to conceal the ground colour except on the sides; antennae brown, third joint about as long as wide, somewhat rounded at tip; (Fig. 28, G) arista very short, blunt at tip, scarcely as long as the antennae (apparently broken off). Thorax brown, nearly opaque; pleurae black. Abdomen yellowish above at base, beyond the hind margin of the second segment it is black above, somewhat bronzed at tip; venter yellow which colour extends up on the sides of the third and fourth segments; hypopygium and its appendages small. Coxae yellow; fore pair with a silvery lustre and minute pale hairs on the front surface and a few yellowish bristles at tip; middle and hind coxae with a black bristle on the outer surface; femora yellow, the hind pair darkened above at

tip; middle and hind femora each with a small bristle close to the apex; tibiae pale yellow, the posterior pair darkened at tip and with a very slender but rather long bristle below just before the basal third and several other small bristles; middle tibiae with two bristles; fore tarsi yellow, darkened towards the tip, first joint not longer than thick, second joint more than half as long as the tibiae, third a little longer than the fourth, fourth scarcely longer than the fifth; hind tarsi blackened from the tip of the first joint which is shorter than the second. Halteres yellow. Wings grayish hyaline, rather narrow at base; fourth vein ending in the apex of the wing; last section of fifth vein three times as long as the cross-vein; veins yellowish brown, costa darker.

Described from one male taken in Douglas Co., Kansas. Type in the collection of the University of Kansas.

This is one of a group of four species which are somewhat related, the antennae being formed about alike in all. The third joint of this species is a little wider in proportion than in the others and the apex more flattened, giving it a quadrate appearance, and the arista is short and blunt (if it has not been broken off). In *frontalis* Loew the arista is slender and tapers to a point; in *vegetus* Wheeler it terminates in a very small lamel, while in *inornatus*, n. sp., it is gradually thickened but still ends in a point. In *frontalis* the fourth joint of the fore tarsi is longer than the third, in *vegetus* the joints of fore tarsi are of decreasing length from the second to the fifth, in *abbreviatus* the third is longer than the fourth but the fifth is not much shorter than the fourth, while in *inornatus* the third and fourth are of nearly equal length, and the fifth is distinctly shorter.

THE SPECIES OF ARGYNNIS IN AMERICA.

BY HENRY SKINNER, PHILADELPHIA.

Recently I received a letter from Mr. Charles Oberthür, of France, in which he says: "In the European collections there is a great perturbation and confusion in the knowledge and determination of the American species of the genus *Argynnis*. The light is very desirable but hard to obtain." The European entomologists are not alone in finding our species extremely difficult, as

they are extremely difficult for us. Confusion has arisen from synonymy, loss of types and lack of knowledge as to what is a species or variety in the genus, lack of accurate data, types not fixed or inaccurately fixed, plastic or variable forms, and specimens only accidentally received through the wanderings of collectors or the accidental habitat of collectors. There are some things that must be done before we can come to a rational understanding of these butterflies. First—a single specimen must be fixed as a type to establish the correct name each species or variety is to bear. Second—to delimit the range of variation of each species. To do this large series must be studied, and they should have exact locality, date of capture and altitude where taken.

Herman Strecker¹ pointed out the difficulties in 1878. He had an excellent idea of the specific relationships of the forms or species.

H. J. Elwes² wrote a revision of the species of the world in 1889, and related his experience in trying to get some rational idea of the American species.

Wm. H. Edwards³ wrote a reply and gave notes on the above revision, and a perusal of both articles gives one an idea of the great confusion and difference of opinion in regard to these insects.

A. J. Snyder⁴ in 1900, wrote a revision of our American species, and gave some valuable information in relation to the forms of *eurynome* Edw., derived from extensive field work in Utah and Colorado.

Dr. W. J. Holland gave a series of exceedingly useful illustrations in the Butterfly Book, but in many instances only figured the upper sides of the species, and there is no way of telling whether they represent types or the contrary.

W. G. Wright, in his Butterflies of the West Coast, figures many species, but many of his determinations are erroneous and only lead to confusion.

Mr. Charles Oberthür, in his *Études Sèp. Comparée* has given some beautiful figures of the Boisduval species and has

1. Beetles and Moths of N. Am., 1878, p. 118.

2. Trans. Ent. Soc., London, 1889, p. 535.

3. Can. Ent., 1890, p. 81.

4. Occasional Memoirs, Chicago Ent. Soc., 1900, p. 27.

helped disentangle the great confusion in the Californian species. Dr. Barnes and McDunnough, in their contributions, have added much to our knowledge of some of the species.

There are some things that are imperatively necessary. A single type (holotype) should be fixed for all of Edwards' species in Dr. Holland's collection in the Carnegie Museum in Pittsburg, and these should be selected in relation to the type locations and specimens mentioned in the original descriptions. Strecker says that Dr. Behr sent him the types of *coronis*, *montivaga*, *rupestris* and *monticola*. Single types should be selected for these four species. The Strecker collection is in the Field Museum in Chicago. We need to know more definitely about Dr. Boisduval's types. Mr. Edwards says⁵ that all of Boisduval's types were sent to him and that they were in his collection. There are many confusing things in the literature in regard to types and other matters.

Dr. Holland says the types of *columbia* Hy. Edw. are in his collection, whereas the type or types are supposed to be in the American Museum of Natural History in New York.

The importance of single type fixation is shown by these citations. A concrete example is as follows: Mrs. Edwards says the types of *A. chitone* are from South Utah and the Weber Mountains (Can. Ent., 1890, p. 83), Drs. Barnes and McDunnough (Contributions, No. III, p. 75) say the Weber Mountain specimens, 1 ♂, 3 ♀'s, represent a different species.

It is impossible to differentiate the species of *Argynnis* from descriptions alone, as while they may have a different facies it is very difficult to describe it in words. As nearly all the species have been well figured in one place or another we can now make progress as soon as the types are fixed. The difficulty of fixing names and relationships is shown by the following names and how they should be treated. Much more depends on the views of the individual student. Are they species topomorphs, varieties or what?—*mormonia*, *arge*, *erinna*, *bischoffi*, *opis*, *washingtonia*, *eurynome*, *clio*, *artonis*, *luski*. There must also be plenty of other variations of these in the many mountains not yet collected in.

5. Can. Ent., 1890, p. 82.

DESCRIPTIONS OF NEW CYNIPIDÆ

BY WM. BEUTENMULLER, NEW YORK.

Andricus castanopsidis, sp. nov.

Female.—Head jet black, finely wrinkled and with whitish hairs on the face. Antennæ long and slender, filiform, 14-jointed, 3rd—8th joints long, the 3rd longer than the others, 9th—14th joints short and not much thicker than the preceding joints, 1st and 2nd joints short and stout, 2nd shorter than the 1st; joints 1-8 rufous, 9-14 black. Thorax jet black and highly polished, microscopically wrinkled, under a high power lens, smooth to the naked eye, strongly arched on the summit. Parapsidal grooves broad and deep at the scutellum, gradually becoming narrower as they reach the collar. These grooves are parallel for their greater length, and converge shortly before their posterior ends. Median groove very faint and only visible in certain lights. Anterior parallel lines very fine and scarcely evident. Lateral grooves wanting. Scutellum black, reticulately rugose, with two very large, deep and glossy basal foveæ. Abdomen rufous, darker posteriorly, with the upturned sheath of ovipositor black. Legs rufous. Wings hyaline; radial area open, the subcostal vein not reaching the costa; cubitus not extending to the first cross-vein; areolet large. Length 4 mm. Antennæ 3 mm.

Gall.—On the blossoms of Western Chinquapin (*Castanopsis sempervirens* and *C. chrysophylla*) in May. Monothalamous. Brown, globular and exceedingly thin-shelled; the outer covering being skin-like. Internally it is filled with a soft, porous, pith-like substance. The round, central larval chamber is thin-shelled and firmly imbedded in the pithy part. The gall is probably green when fresh and very soft. Diameter 12-24 mm.

Habitat.—Pacific Grove, Monterey Co., Calif. (Miss Dorothy Egbert), galls and flies; Truckee, Calif. (H. G. Dyar), galls and flies, U. S. Nat. Mus.; Mt. Tamalpais, Calif. (L. H. Weld), galls; Placer, Co. (A. Koebele), galls.

A distinct species very much resembling a *Diastrophus* in general appearance. The point of attachment of the gall is very short, and when mature it drops to the ground. The male is unknown.

Andricus myrtifoliae, sp. nov.

Female.—Pale, uniform yellowish brown, legs and antennae paler. Head opaque and finely punctate. Antennae 13-jointed, basal joints filiform, terminal ones stouter and much shorter. Thorax opaque, evenly and finely punctate. Parapsidal grooves fine, continuous and converging at the scutellum. Lateral grooves indistinct. Anterior parallel lines very fine. Median groove evident only for a short distance at the scutellum, wanting anteriorly. Pleurae wholly punctate. Scutellum opaque, finely rugoso-punctate, with two broad, deep, almost contiguous, basal foveae. Abdomen smooth and shining. Wings delicate, hyaline with the veins very faint. Radial area open at the costa. Cubitus continuous. Areolet not evident. Length 1–1.25 mm.

Gall.—In clusters on the blossoms of *Quercus myrtifolia* Monothalamous. Small, cone-shaped bodies, each containing a single larval cell. When dry the gall is dark brown or almost black. At the point of attachment it is flattened, and from this part it gradually tapers to a blunt point at the apex. Length 2.50–3 mm.

Habitat. Jacksonville and Palat Ka, Fla. (Lewis H. Weld.) The galls of this species were collected by Mr. Weld in April, 1914, and the flies emerged in a paper package and were all dead when he unpacked his Florida material in July, 1914. Mr. Weld informs me that the galls looked about the same in colour when they were collected, but they may be greenish when they first appear. The male is black with pale, yellowish brown legs and antennae. The latter is 15-jointed, with all the joints stouter, the 3rd excavate beneath.

Andricus gemmiformis, sp. nov.

Female.—Head black, face very finely and minutely granulate, cheeks almost smooth. Antennae 13-jointed, brown, paler at the junctions of the joints in certain lights, four terminal joints black. Thorax rufous, with a broad, black band from the collar to a little beyond the middle, and a similar band outside the parapsidal grooves extending forward to beyond the middle. Finely and closely punctate, subopaque. Parapsidal grooves subparallel, continuous, sharply defined and not much wider apart at the

scutellum than at the collar. Lateral grooves distinct in the black area. Anterior parallel lines very narrow and not sharply defined. Median groove wanting. Scutellum rufous, rugose with two large, somewhat shining basal foveæ. Mesopleura rufous granulate. Metapleura black, smooth and shining. Abdomen globose, smooth and shining, rufous, darker dorsally. Legs rufous, posterior femora darker. Wings hyaline, veins fine. Radial area closed. Cubitus continuous. Areolet small. Length 2-2.50 mm.

Gall.—On the trunk of white oak (*Quercus alba*), May-October. Monothalamous. Green, sometimes tinged with red. Bud-shaped, elongate, pointed at the apex, thin-walled when mature and hollow inside and containing no separate larval chamber. When young it is more solid. Length 3-4 mm.

Habitat.—Fort Lee district, New Jersey; Woodlawn, New York City.

The gall is found on the trunk of large, white oak, where the same is gnarly and young shoots sprout forth. It is imbedded in a cavity and may be easily removed. The gall looks exactly like the bud of a young sprout, and may be readily mistaken for such and overlooked. I have found fully developed galls May 30th and in June, and also late in October, 1915. One female emerged in October, 1915, from a gall collected in May, 1915, and one female in May, 1916, from a gall taken in October, 1915. Mr. L. H. Weld has also taken the gall at Evanston, Illinois. The male is unknown.

***Andricus dugesi*, sp. nov.**

Female.—Head dark rufous with short, whitish hairs, face and vertex rather coarsely rugose, cheeks finely granulated. Antennæ 14-jointed, dark rufous. Thorax dark rufous, granulated with coarse, transverse wrinkles, giving the surface a rough appearance. Parapsidal grooves continuous, widely separated at the collar and converging at the scutellum, median groove continuous. Lateral grooves blackish and long. All these grooves are wrinkled. Anterior parallel lines smooth and extending to the middle of the thorax. Scutellum coarsely rugose, rufous with two large, blackish basal foveæ, almost lost in the rugosity of the surface. Pleuræ rugose. Abdomen rufous, smooth, with decumbent yellowish hairs. Legs rufous. Wings yellowish brown,

hyaline and pubescent. Veins dark brown. Radial area open, both veins very close to the costa. Cubitus continuous. Areolet very large. Length 4-5 mm.

Habitat.—Guanajuato, Mexico, Oct. 4, 1900. (A. Duges).

Allied to *Andricus cameroni* Ashmead, but differs in the larger size, the colour and sculpture of the thorax and in the wings being considerably more yellowish. It is one of the largest species of *Andricus*. The gall is not known. The types are in the U. S. Nat. Mus., and cotypes in my collection.

***Biorhiza cæpulæformis* Beutenmuller.**

When I described this species under the name *Andricus cæpulaformis* (Ent. News, Vol. XXII, 1911, p. 69), I was under the impression that the wings had not been fully developed, because the dead example was cut from a gall. Mr. Lewis H. Weld collected many of the galls at Evanston, Illinois, early in October, 1916, at the base of red oak (*Quercus rubra*) shoots growing from a stump, and sent me many examples from which I cut at least fifty fine, living females, in October, 1916. Mr. Weld's specimens issued Nov. 23-26th, so the species seems to emerge late in fall. In all these the wings are abbreviated, consequently the species must be removed from the genus *Andricus* and placed in *Biorhiza*. The head and thorax are dark rufous, and the scutellum is black. The abdomen is large, globular, smooth and highly polished, black with the sides and junctions of the segments dark rufous. The legs are very long, dark rufous with the tibiæ infuscated, as are also the femora of the hind legs. It measures from 4-5 mm., in length, and the wings 2.50 mm. It very much resembles a queen ant, but it is sluggish in habit and feigns death at the slightest touch. When cut from the gall it emits a rather strong, fragrant odor. It is a fine species and may be the alternating form of some bisexual species. Possibly *Dryophanta lanata*.

***Amphibolips nigra* Beutenmuller.**

Gall.—On the twigs of a species of oak; monothalamous; densely wooley and about the size of a small peach, and also somewhat the colour of this fruit, especially those on the trees suffering from peach-yellows, probably white when fresh and tinged with pink. It contains a hard, thick-shelled, oval cell about the size of a bean. Diameter 22-50 mm.

Habitat.—Durango, Mexico, (Dr. A. Palmer). The types are in the U. S. Nat. Mus., and cotypes in my collection. The adults emerged from January 30th to February 8th, 1897.

***Dryophanta floridensis*, sp. nov.**

Female.—Head black, evenly and finely granulate. Antennæ black, basal joints pale brown, 14-jointed. Thorax jet black, highly polished, microscopically punctate, more so anteriorly. Parapsidal grooves distinct, deep, continuous, widely apart at the collar, and about half as wide apart at the scutellum. Median groove wanting. Lateral grooves not sharply defined and scarcely evident. Anterior parallel lines not evident. Pleuræ subopaque, finely rugose, with a polished area. Scutellum black, rather strongly rugose, basal fovea large. Abdomen black, somewhat compressed, subtriangulate, smooth and polished. Legs pale brown. Wings hyaline, veins brown. Radial area closed. Cubitus continuous. Areolet minute. Length 2–2.25 mm.

Gall.—On the trunks of Spanish Oak (*Quercus digitata* and Blue Jack (*Quercus brevifolia*), that are six or more inches in diameter; in April. The gall is soft and fleshy and does not look like a gall at all. At the base of each sprout there is a rather large cell, which is covered with short, fuzzy, abortive leaflets. They occur in clumps and are dormant bud galls.

Habitat.—Ocala and Jacksonville, Florida, (Lewis H. Weld).

TWO UNNAMED CALIFORNIAN BUTTERFLIES.

BY FORDYCE GRINNELL, JR., PASADENA, CALIF.

***Strymon sylvinus desertorum* subsp. nov.**

♂.—Fore wings: upper side, mouse colour along the costal margin to below the cell, along the outer margin diminishing to the inner margin and basally where it is lightest; fulvous from the dark outer margin, fading gradually towards the base. Hind wings: upper side, light mouse colour basally and along the costal region; a darker band along the outer margin; grayish in the inner fold; a very distinct and light fulvous area in the anal region and along the outer margin diminishing towards the upper edge; two tails, black, tipped with white; fringes white. Under side: fore wings, ashy, a very faint discal spot, marginal line and row of spots barely

discernible, followed by a heavier row of six black dots. Hind wings with a continuation of the inner row of heavy black dots, the last two heaviest; also the first row of spots or crescents between this and the margin. A large, distinct red patch in the anal angle and a smaller patch of blue or purple scales.

♀.—Similar to the male.

Expanse 32 mm.

Types.—One male and one female in the author's collection. Eleven topotypes. One or more topotypes will be deposited in the Barnes' collection.

Habitat.—Oak Creek, Kern County, California, June 29, 1905, collected by the writer. Oak Creek "flows" from the Tehachapi Mountains into the Mojave desert. The type locality is in semi-desert conditions, but about two miles further down are true desert conditions with the characteristic tree yuccas and other desert plants.

The male specimen selected as the type was sent to Dr. McDunnough, who returned it marked "A form of *sylvinus* close to *dryope* Edw." There are two or three specimens in the series with no fulvous on the upper sides of the wings; but the very lightly marked under side and peculiar light fulvous extension on the upper side mark this as a readily distinguishable desert race.

***Glaucopsyche behri australis*, subsp. nov.**

This Southern Californian race of *behri* (Edwards) has been generally named and distributed by collectors as *antiacis* or *polypheumus*, but as Dr. McDunnough has shown in his careful studies of Boisduval's types these names cannot hold, but are applicable to species or forms of the San Francisco Bay region. It is figured on Plate XXIX, 367, b., c., of Wright's Butterflies of the West Coast, as *antiacis*. *Australis* is very variable, much more so than *behri*, and is evidently in a comparatively rapid process of species change or formation from the probable original form of the San Francisco region with large, distinct, round, black spots, known as *behri*. The spots on the under side of the fore wing of *australis* (type) are large but run together as compared with *behri*, and with white rings; while those on the hind wing are much smaller. A surprisingly large number of specimens taken in the region of

australis show a disappearance or an approaching disappearance of the black spots, leaving only indistinct white spots in their places, or with a small, black dot in the centre. The black spots of *australis* are, also, more irregular in outline than the more circular ones of *behri*. *Behri* is much less variable.

Type.—One ♂ from Pasadena, May 20, 1907, by the writer and in his collection. Topotypes will be deposited in the Barnes' collection.

Distribution.—From Santa Barbara (extending north to Monterey County) to San Diego west of the mountains. This distinct faunal area is known as the San Diegan Faunal District. It occurs from February to June.

GEOMETRID NOTES.

A NEW SPECIES OF EUCHLÆNA.

BY L. W. SWETT, BOSTON, MASS.

***Euchlæna albertanensis*, sp. nov.**

Expanse 45 mm. Palpi, head, thorax and abdomen pale yellow ashen, primaries of the same colour. Base of primaries to basal line darker than central portion, striated with fuscous. Basal line reddish brown, making an outward curve to median vein, then running straight to inner margin. Central part paler than rest of wings, finely striated and with small, black, discal spot. Extra discal line brownish, making an outward angle below costa, then running straight to vein 3, where there is slight inward curve to inner margin. There is a faint line bordering extradiscal, which separates from it at costa and inner margin. Outer margin darker, as is base, with with pale apical streak and black spot at the end, almost opposite angle of extradiscal line. Fringe pale yellow, outer margin somewhat extended at vein 5. Secondaries same colour as primaries, only basal portion is lighter yellow. A broad, suffused, brown basal band, discal space very pale yellow and containing round, black, discal spot. Extradiscal line crosses wing at almost right angles, hardly curved. The outer brown shade line makes a projecting blunt jointed loop below discal spot. Beyond extradiscal line the wing is darker than in the centre of the wing. The fringe is the same colour as on the primaries, but there are two deep notches near veins 5 and 6. Beneath primaries

marked as above but not darker in basal and marginal area. Secondaries marked as above, pale yellow, with striations.

This species appears to be close to *pectinaria* Denis and Schiffermüller and its synonym *deductaria* Walker, which may be a good species and not the same as *pectinaria*. In the copies of Denis and Schiffermüller's work in the Boston Society of Natural History, I can find no figure or any description and it seems as if there may be an incorrect reference, so that *deductaria* Walker will, at least, represent an Eastern form. This species, *alberta-nensis*, is apparently not common, as Mr. Wolley-Dod, from whom I received the type, stated he had seen but few. Since then I have received other specimens from Mr. Bowman and Mr. Mackie, of Alberta.

Holotype.—♂, May 31, 1912, Calgary, Alberta, from Mr. Wolley-Dod, and in my collection.

Allotype.—♀, June 16, 1916, Edmonton, Alberta, in Mr. Bowman's collection.

Paratypes.—Two ♂'s, Edmonton, Alberta, in Mr. Mackie's collection.

THE ANTHOMYID GENUS PHYLLOGASTER.— ADDENDUM:

Since sending my paper on the Genus *Phyllogaster* to the press* I have read C. W. Johnson's paper in the April number of the Canadian Entomologist, in which he describes a new species of this genus under the name *robustus*. An examination of paratypes of *robustus* discloses the fact that in addition to the difference in size between the species and *cordyluroides*, the male may readily be separated from the latter and also from *littoralis* by the presence of a large number of strong bristles on the basal dorsal segment of the hypopygium (two in the others) and the much larger pulvilli which exceed in length that of the apical tarsal joint, whereas in the others they are much shorter than it. The female of *robustus* has two thorns on apical abdominal segment, *littoralis* has four, the female of *cordyluroides* is unknown to me. As in *cordyluroides* the third vein of the wing is bare in *robustus*.

J. R. MALLOCH.

*Can. Ent. XLIX, July, 1917, p. 227.

AN ANNOTATED LIST OF THE SCOLYTID BEETLES OF OREGON.

BY W. J. CHAMBERLIN, OREGON EXPERIMENT STATION,
CORVALLIS, ORE.

(Continued from page 328.)

Phloeosinus dentatus Say.

A single specimen collected from *Chamæcyparis nootkatensis* at Elk Lake, Oregon.

Phloeosinus punctatus Lec.

This beetle was found doing considerable damage to the juniper (*Juniperus occidentalis*) in the vicinity of Bend and Prineville, in Central Oregon. Both male and female work, excavating a short gallery $1\frac{1}{4}$ to $1\frac{3}{4}$ inches long, running with the grain of the wood. Eggs are deposited in niches on each side of the gallery and are sealed in by a wall of frass. The young larvæ work out at more or less right angles to the egg gallery. Eggs, larvæ and pupæ were collected in early May at Bend. Completed egg galleries of the same species were found in Incense cedar (*Libocedrus decurrens*), on the Klamath Indian Reservation a month later. It has been taken from its galleries in Western red cedar (*Thuja plicata*), Alaska cedar (*Chamæcyparis nootkatensis*), and Port Orford cedar, (*Chamæcyparis lawsoniana*), in the western part of the State. It probably attacks all the trees of the juniper and cedar group. The cocoons of an unidentified hymenopterous parasite were found in the mines in juniper.

Phloeosinus cristatus Lec.

This species is rare; attacks Alaska Cedar (*Chamæcyparis nootkatensis*), Noble fir (*Abies nobilis*), and Engelmann Spruce (*Picea engelmanni*).

Phloeosinus sequoiæ Hopk.

Occurs in *Thuja plicata* and *Sequoia sempervirens* in the southwestern portion of the State.

Pseudohylesinus nebulosus Lec.

The adults of this species emerge in March in the Willamette Valley. After emergence, no time is lost in attacking a new host. Douglas Fir is their principle host tree and living, dying or felled trees, especially in the sapling and pole stages are favourites. When

such timber is not available the limbs of larger trees are selected. The female starts the gallery and is soon followed by the male. The entrance gallery is at an oblique angle, and upon reaching the cambium a gallery is run parallel to the grain by the female. The male works in the opposite direction. The eggs are deposited in little niches chewed out by the female. The eggs hatch in 5 to 7 days and the larvæ work out at more or less right angles. Pupation takes place in the bark. The parent adults die in the mine after the eggs are deposited. In most cases the male is found blocking the entrance with his dead body, and the body of the female is found at the far end of the gallery. Observed in both Eastern and Western Oregon.

Pseudohylesinus nobilis Swaine.

This species was found entering the thick, flinty bark near the base of large, living *Abies nobilis* in the Cascade Mountains in August, 1914.

Pseudohylesinus laticollis Swaine.

Found with the above species on *Abies nobilis* and later taken from *Abies lasiocarpa*.

Pseudohylesinus, n. sp.

A very large specimen taken in the act of boring into Lebanon Cedar (*Cedrus libani*), on the College grounds.

Pseudohylesinus undescribed species allied to *nebulosus* Lec.

A number of specimens in the collection taken at Elkton, Oregon. February 16, 1896. No host given.

Pseudohylesinus griseus Swaine.

This species is less common than *P. nebulosus*, but in habits, life history, etc., is very similar. Found attacking Douglas fir at Breitenbush Hotsprings in the Cascade Mountains in April.

Pseudohylesinus sericeus Mannh.

Very similar to last two. Bred in numbers from Douglas fir collected at Corvallis, Astoria, and Detroit, Oregon.

Pseudohylesinus sericeus var.

A species differing considerably in size and markings. It was bred from Douglas fir at Corvallis in August.

Pityophthorus pubipennis Lec.

Occurs abundantly in Ash (*Fraxinus oregona*) and Oak (*Quercus gerryana*) in the western valleys.

Pityophthorus puncticollis Lec.

Occasionally met with in spruce (*Picea sitchensis*) and in *Pinus contorta*.

Pityoktaines jasperi Swaine.

I have two specimens of this insect as determined by Professor Swaine. One taken from *Abies grandis* and the other from *Abies lasiocarpa* near Sumpter, Oregon, July, 1914.

Procryphalus aceris Hopk.

Type taken from *Acer macrophyllum* at Albany, Oregon. April 28, 1899. Hopkins.

Tomicus (Hylastes) nigrinus Mannh.

Taken from Douglas fir at Corvallis, Ranier, Astoria and Svensen, Oregon.

Pityogenes carinulatus Lec.

A small species found girdling and killing twigs and small branches, $\frac{1}{8}$ to 1 inch in diameter. Occasionally larger limbs were found attacked. Living, dying and felled yellow pine (*Pinus ponderosa*) was found attacked at Bend, Oregon, in May. A rough circular chamber $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter is eaten out, from this radiate 5 to 8 egg galleries $\frac{1}{2}$ to $1\frac{1}{2}$ inches long. The eggs are pearly white, slightly less than 1 mm. long, oval, buried in the frass. Adults, young larvæ and eggs were collected May 19, 1916.

Pityophthorus confusus Lec.

Swaine (N. Y. S. Mus. Bul. 134) gives the range of this species as transcontinental and gives Washington and California, so the species undoubtedly occurs in Oregon, though I have never collected it.

Pityophthorus confertus Swaine.

Bred from pine cones collected at West Port, Oregon. Cones collected August 20, and adults emerged September 11.

Pityophthorus nitidulus Mannh.

A widely distributed species which is found in dying *Pinus*, *Picea* and *Pseudotsuga*, throughout the State.

Pityophthorus, n. sp.

A species similar to *nitidulus* but larger and darker has been collected a number of times from *Abies grandis* and *Abies nobilis*; from the former tree in the valleys, from *nobilis* in the Cascades.

Trypodendron (Xyloterus) lineatus Oliver.

The true *lineatus* seems to be very rare, though a closely allied species is common. I have what I believe to be the true species from Seaside, Oregon. They were picked up on the beach during a storm in December, 1916.

Trypodendron (Xyloterus) politus Say.

There is a single specimen in the College collection bearing the label "Huntington, Oregon." Probably erroneously labeled.

Trypodendron rufitarsis Kirby.

A number of specimens collected from *Pinus contorta*, near Sumpter, Oregon, July 14, 1914.

Trypodendron, n. sp., near *rufitarsis*.

Collected from living Douglas fir at Breitenbush Hot Springs, April and August, 1914.

Xyleborus dispar Fabr.

In orchard trees; Portland, Salem, Corvallis, Oregon City, and Eugene; April to June.

Xyleborus xylographus Say.

Specimens assigned to this species taken from Oak (*Quercus gerr yana*) and Douglas Fir (*Pseudotsuga taxifolia*) at Corvallis.

Platypus wilsoni Swaine.

Abies grandis, Corvallis; *A. nobilis*, Elk Lake; *Tsuga heterophylla*, Detroit, and *Pseudotsuga taxifolia* at Corvallis and Ranier.

Editor's note.—Mr. J. M. Swaine has informed me that *Ips wieslanderi* Swaine, which was listed in the first part of Mr. Chamberlin's paper (p. 327) is an old manuscript name for the species described as *Ips radiata* Hopkins.

Leperisinus aculeatus Lec. (p. 328) and *Hylesinus aculeatus* Say, (p. 326), are synonymous, and should be listed under the latter name.

A NEW WEST INDIAN CHALCID-FLY.

BY A. A. GIRAULT, GLENNDALE, MD.

***Achrysocharella albitibiæ*, n. sp.**

Female.—Length 1.50 mm.

Dark metallic green, the scape, tibiae, knees and tarsi white. Scape compressed. Funicle 2 subequal to club 3; terminal spine

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of club subequal to club 3. Head and thorax scaly punctate, the propodeum subglabrous, also segment 2 of abdomen; rest of abdomen delicately scaly. Wings hyaline, the venation pallid yellow. Mandibles bidentate. Antennae with two distinct ring-joints, two funicle-joints and three club-joints, the latter with a long terminal spine and the region tapering. Stigmal vein sessile, half the length of the postmarginal, the marginal over half longer than the submarginal. Hind tibial spur short and stout. Funicle 2 quadrate, 1 somewhat longer than wide, shorter than the long pedicel. Segment 2 of abdomen occupying about a sixth of the abdomen. Propodeum noncarinate. Axillae somewhat advanced. Parapsidal furrows slightly indicated from cephalad, subobsolete, a straight, oblique groove laterad of the spiracle. Abdomen sessile.

From a single female on a tag in the U. S. National Museum, labeled "*Nesomyia albipes* Ashmead, 242. Leeward side, St. Vincent, W. I., H. H. Smith."

Type.—Catalogue No. 20349, U. S. Nat. Museum, the specimen on a tag and a slide.

This does not appear to be the genotype of *Nesomyia* Ashmead MS., since I describe elsewhere a second species similarly labeled and belonging more properly where Ashmead assigned the genus. None of the West Indian species of *Closterocerus* belong to that genus.

ON SOME NEW AND KNOWN MELANDRYIDÆ (COL.)

BY CHARLES SCHAEFFER, BROOKLYN, N. Y.

Carebara californica, new species.

Elongate, subdepressed, brown, antennae, palpi, legs and underside paler. Head convex with moderate punctures; antennae about as long as head and prothorax, third joint longer than second or fourth, fifth to tenth about as long as wide and nearly equal in size but shorter than fourth, eleventh elongate oval. Prothorax wider than long, apex a little narrower than base; sides rather feebly arcuate; basal and apical angles broadly rounded; basal margin feebly arcuate; surface moderately punctate; basal foveae feeble. Elytra about two and one-half times as long as

prothorax and not wider than the latter at base; sides feebly diverging, nearly parallel; apex broadly rounded; surface with slightly finer punctures than those on the prothorax. Under side punctured nearly like the upper side. Length 4.25 mm. Fresno Co., Cal.

This species differs from *longula* in the shape of prothorax and differently formed antennal joints. The sides of prothorax in *longula* are almost parallel, the fourth antennal joint triangular and the outer joints are wider than long; the upper surface is also more depressed in *longula* than in *californica*. *Carebara longula* was described from the Middle States and specimens taken in this neighbourhood at Wyandanch, Long Island, and Jamesbourg and Lakehurst, N. J., agree better with the description of that species than my California specimens, some of which I received from Ricksecker as *C. longula*.

Hallomenus binotatus Quens.

I have a specimen from Montreal, Canada, given me by Mr. Chas. Liebeck which agrees closely with the description of this European species. Mr. Liebeck writes me that he has received several specimens of the same species from the above mentioned locality taken at different times.

It is similar in form, size and antennal structure to *scapularis*, the colour brownish-yellow and the prothorax with two black longitudinal lines. The elytra are obsoletely striate, the prothorax more finely granulate and the basal margin more distinctly sinuate than in *scapularis*.

Scraptia oculata, new species.

Very much like *sericea* but a little more elongate, punctuation of upper surface almost the same as in that species; the second and third joints of antennae are smaller and together not as long as the fourth joint in the male, in the female the second and third joints together are equal or nearly so to the fourth joint. The eyes are larger and separated on the front by a much smaller space than in *sericea*. The last ventral segment of the male is deeply, longitudinally impressed at middle and at apex triangularly emarginate. Length, male type, 5 mm. Huachuca Mts., Arizona.

***Allopoda lutea* Hald.**

Hallomenus fuscotuturalis Blatchl. Can. Ent. XLV, 24.

Specimens received from Prof. Blatchley of his *Hallomenus fuscotuturalis* are the same as our common *Allopoda lutea*.

***Allopoda arizonica*, new species.**

Form of *lutea* but generally of a darker and uniform colour. Head moderately coarsely punctate, punctures more closely placed than in *lutea*, eyes rather large; antennæ rather longer than in *lutea*. Prothorax transverse, sides arcuately narrowing from the narrowly rounded hind angles to a little before apex and then more strongly rounded to apex; surface more closely punctate than in *lutea*. Elytra slightly wider at base than the prothorax; apices separately rounded; surface a little more closely and finely punctate than in *lutea*. Length 4 mm. Huachuca Mts., Arizona.

This species differs from *lutea* in the denser pubescence and punctuation, shorter and more transverse prothorax and relatively longer antennal joints.

***Allopoda californica*, new species.**

Narrowly elongate, rather sparsely pubescent, colour fusco-testaceous, first two joints of antennæ, palpi, legs and under side paler. Head moderately closely punctate; antennæ longer than the head and prothorax together, third joint not quite twice as long as second, fourth a little longer than third. Prothorax transverse, sides nearly parallel in about basal third, then rather strongly, arcuately narrowing to apex; hind angles feebly rounded; basal margin trisinate, the median sinuation stronger than on each side of middle; basal foveæ distinct; surface rather finely punctured. Elytra about three times as long as the prothorax; sides feebly arcuate; apex broadly rounded; surface rather finely and moderately closely punctate. Length 4.5 mm. Tulare Co., Cal.

The type and only specimen seen is a female in the collection of the late Ottomar Dietz. It differs from *arizonica* and *lutea* in slightly larger size more elongate form, base of prothorax more distinctly trisinate and especially in the form of maxillary palpi, which are in *californica* elongate, cultriform, as in *Canifa* but it

differs from species of that genus by the very small, somewhat triangular, labial palpi and the simple, not lobed, penultimate joint of hind tarsi. It is possible that a new genus has to be erected for this species as the genera of the tribe Scaptiini are separated by the form of the last joint of maxillary palpi and the form of the penultimate joint of hind tarsi; which are lobed in *Scaptia* and *Canifa* but simple in *Allopoda* and the Central American *Evalces*.

SPECIES OF THE GENUS BRACHYOPA OF THE EASTERN UNITED STATES (DIPTERA).

BY CHARLES W. JOHNSON, BOSTON, MASS.

TABLE OF SPECIES.

1. Arista microscopically pubescent. 2
Arista conspicuously pubescent, species yellow. *notata* O. S.
2. Species yellowish or brownish. 3
Species blackish. 5
3. Dark brown, three thoracic lines, second abdominal
segment light yellow, somewhat translucent. . . *vacua* O. S.
Light brown and yellow. 4
4. Thorax, dorsum brown, with four black lines,
6-7 mm. *media* Will.
Thorax, dorsum yellow, with four brown lines,
5 mm. *flavescens* Shan.
5. Thorax, dorsum grayish pollinose with five black
lines, abdomen entirely black. *daeckeï*, sp. n.
Thorax, dorsum grayish pollinose with four black
lines and short diverse lines, abdomen black,
marked with grayish pollen. *diversa*, sp. n.

Brachyopa daeckeï, sp. n.

Front black, grayish pollinose, a shining spot above the base of the antennæ yellow, bordered with black, face below the antennæ grayish pollinose, sides shining, yellow with two spots of black, antennæ dark yellow, arista brown. Thorax black, grayish pollinose, with five subshining lines, the three inner ones slightly diverging but not reaching the scutellum, pleura brownish grayish pollinose, scutellum brown, the apical half much lighter than the

base. Abdomen black, shining, hairs white. Legs brown, hairs white, outer half of the posterior femora blackish, tarsi yellowish, halteres yellow. Wings hyaline, veins brown, stigma yellow, anterior cross-vein slightly clouded with brown, tegulae white. Length 6 mm.

One specimen, Castle Rock, Delaware Co., Pa., May 19, 1902, collected by Mr. V. A. E. Daecke. Type in the author's collection. This specimen has been referred to as a dark variety of *B. media* (Psyche, Vol. XVII, p. 230, 1910) but further study in connection with the following species convinces me that it is distinct. The thoracic lines and abdominal characters seem very constant in this genus.

***Brachyopa diversa*, sp. n.**

Face and front yellowish, whitish pollinose, a shining spot above the antennae and a shining brown streak across the cheek, occiput black, grayish pollinose, finely punctate, antennae dark yellow, arista black. Thorax black, brownish pollinose, with four shining black lines and short diverse lines, the two dorsal lines not reaching the scutellum, but a short median line extending forward from the scutellum, the subdorsal line interrupted by a prominent sutural line, short oblique lines extending anteriorly from the posterior ends of the subdorsal lines towards the ends of the dorsal lines, humeri and a large spot above the base of the wing shining black, pleura grayish pollinose with white hairs, scutellum dark brown. Abdomen: first segment grayish pollinose, second segment grayish pollinose except a median and large, round lateral spots of shining black, third and fourth segments shining black, excepting the posterior pollinose margins. Legs black, bases and tips of the femora and tibiae, and the tips of all of the first three tarsal joints yellowish. Halteres white, wings hyaline, veins brown, stigma yellow, anterior cross-vein and the angles of the discal cell clouded with brown, false vein prominent, extending to the end of the discal cell, apical portion of the fourth vein with two stubs, one at the obtuse angle, the other slightly anterior and extending into the first posterior cell, a stub also extending into the discal cell, tegulae white. Length 7 mm.

One specimen near Shattuck Inn, Jaffrey, N.H., June 18, 1917,

on the flowers of the choke cherry. Type in the collection of the Boston Society of Natural History.

***Brachyopa flavescens* Shannon.**

B. flavescens Shannon, Insecutor Inscitiae Menstruus, Vol. III, p. 144, 1915.

This species is closely related to *B. media* from which it can be separated only by its somewhat smaller size and lighter coloured thorax. In some specimens the anterior portion of the thorax is dark brown, strongly suggesting that it may prove to be only a variety of *B. media*.

Specimens agreeing with those from the type locality, Dead Run, Va., have been collected on the summit of Mt. Greylock, Mass., June 15, 1906, Bretton Woods, N.H., June 26, 1913, and near the Glen House, base of Mt. Washington, N.H., June 14, 1916.

***Brachyopa media* Williston.**

This widely distributed species varies considerably both in size and colour. In some specimens the legs are quite dark and the abdomen has a distinct median line. It has been collected at Bretton Woods, N.H., June 24; Glen House, N.H., June 14 and June 15, Jaffrey, N.H., June 21, 1917, and Sherborn, Mass.

BOOK NOTICES.

GUIDE TO THE INSECTS OF CONNECTICUT, PART III. The Hymenoptera or Wasp-like Insects of Connecticut. Bulletin No. 22, Connecticut Geological and Natural History Survey. By Henry Lorenz Viereck, with the collaboration of A. D. McGillivray, C. T. Brues, W. M. Wheeler and S. A. Rohwer. 824 pp., 10 plates. Hartford, 1916. \$1.50.

This is the first attempt to present a complete systematic treatise of the Hymenoptera of any state of the Union and the State Entomologist, Dr. Britton, under whose direction the work was undertaken, as well as the various authors, deserve the thanks of the entomological public throughout North America for the admirable manner in which their work has been accomplished.

In the Introduction, by Mr. Viereck, the general characters of the order Hymenoptera are set forth and the economic significance of the various groups is discussed. The various superfamilies

are then taken up in order, each being defined and the taxonomic characters illustrated by outline figures of a typical species. Full keys are given to the families, subfamilies and genera, and in the great majority of cases also to the species, which in any case, are fully characterized. Lists of localities are given for each species, with the names of the collectors, and the names are also included of species not yet recorded from Connecticut but likely to occur there. The same general plan of treatment has been followed by the various authors though their methods differ slightly in detail.

The chief author, Mr. Viereck, is responsible for the Ichneumonoidea, Cynipoidea, Chalcidoidea, Chrysidoidea, Apoidea and part of the Vespoidea; the Tenthredinoidea are by Prof. MacGillivray, the Serphoidea and Proctotrypoidea by Mr. Brues, the Formicoidea by Prof. Wheeler, and the Sphecoidea and greater part of the Vespoidea by Mr. Rohwer.

Besides the text figures there are ten good half-tone plates from photographs, on which are illustrated typical examples of the order, including representatives of most of the superfamilies; and also various types of Hymenopterous larvæ, cocoons, nests, galls, etc.

This is a book which should be in every entomological library and will be as indispensable to the general student as Blatchley's *Coleoptera of Indiana*.

THE BLATTIDÆ OF NORTH AMERICA, NORTH OF THE MEXICAN BOUNDARY. By Morgan Hebard. *Memoirs of the American Entomological Society*, Number 2. Published by the American Entomological Society at the Academy of Natural Sciences, Philadelphia, 1917. 284+vi pp., 10 plates.

Students of Orthopteroid insects will all welcome the appearance of this masterly revision of a difficult and perplexing group. While a good many papers on the North American Blattidæ, or Cockroaches, have been published within recent years, we have now for the first time a comprehensive review of the entire subject from the systematic standpoint. It is in fact far more than a review, for important new characters have been brought to light, and no less than five new genera and eight new species are described. A fifth new generic name, *Parcoblatta* (= *Platamodes* Scudder,

preoccupied), is introduced to include nearly all of the native species commonly placed in *Ischnoptera*, this genus together with *Blattella* having been found to contain many valid generic units. Only one true *Ischnoptera*, *I. deropeltiformis* (Brunner), belongs to the North American fauna, while the only species of *Blattella* represented in the New World is the introduced and cosmopolitan genotype, *B. germanica* (L).

A valuable feature of the work is the careful definition of the characters of diagnostic value, including the methods of measurement. The venational terminology, which is illustrated by a diagram of a typical blattid tegmen and wing, is that which has been commonly employed by orthopterists, but in the present writer's opinion it is somewhat to be regretted that the more generally applicable system of Comstock and Needham was not substituted.

Although detailed descriptions of genera and species have been avoided, the characters of real importance have been carefully analyzed and much attention has been given to coloration and to the range of variation in each species. The geographical distribution is also treated in great detail, the exact localities with other available data being given for all the material studied.

Forty-three species are recorded as established within the United States and of these ten are probably introduced. Species are numerous only in the limited tropical areas along the southern border of the country, rapidly diminishing northward, there being only two indigenous forms and two established adventives which are known to occur north of the Canadian boundary.

Following the descriptive account of the Blattidæ that are native or naturalized within the territory under treatment is a supplement dealing more briefly with the adventive forms, tropical cockroaches being frequently carried by commerce to more northerly localities, where they usually fail to become established. There are thirty-one species in this category, eight of which are also native in southern portions of the United States.

The extensive series of illustrations are beautifully executed drawings, which leave nothing to be desired.

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POPULAR AND PRACTICAL ENTOMOLOGY. GRAPHIC PRESENTATIONS OF ENTOMOLOGICAL FACTS.

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

In reading over various entomological publications, one is impressed by the growing tendency of authors to present their facts where possible, in a graphic manner. In support of this statement, it is only necessary to recall in various publications, the many charts showing curves of insect activity of one sort or another. There are many entomological authors, however, who have not adopted this forward step and in support of this, one has only to remember the numerous tables of figures so often to be found.

Many readers, when they arrive at a page containing detailed information in the form of printed tables, experience a sinking sensation and unless they are especially interested in the insect or activity in question, they are inclined to pass hurriedly over this part and seek a summary if one is to be found. It is realized, of course, that many entomological facts cannot be treated graphically, but on the other hand, many can but are not and to those who are not in the habit of using illustrative charts wherever possible in their publications, this paper is intended as a slight suggestion along such lines.

Much time and money is expended in the collection of entomological data and unless this material is presented in a clear and interesting manner, the maximum amount of benefit will not be secured. Not only is time saved for the reader by graphic presentations, but the facts are put before him in such a manner that they appeal to him more strongly, he remembers them better and it is less possible for him to draw wrong conclusions when quantitative facts are placed before him in accurate proportions. Such presentations do not as a rule require as much space as printed words. They do require more work of the author, but if the data are worth

collecting at all, they are certainly worth presenting in a manner likely to convince the reader, thereby obtaining the desired results.

The scope of this paper is purely suggestive and the following figures are of the simplest. If one starts only to think of the best way to present his facts, various graphic methods will suggest themselves to him and by placing himself in the position of the readers he is trying to reach, he can decide upon the best method to use. Graphic methods are used by banking houses, corporations, railroad companies, statisticians, engineers and many others in business and professional occupations, and there

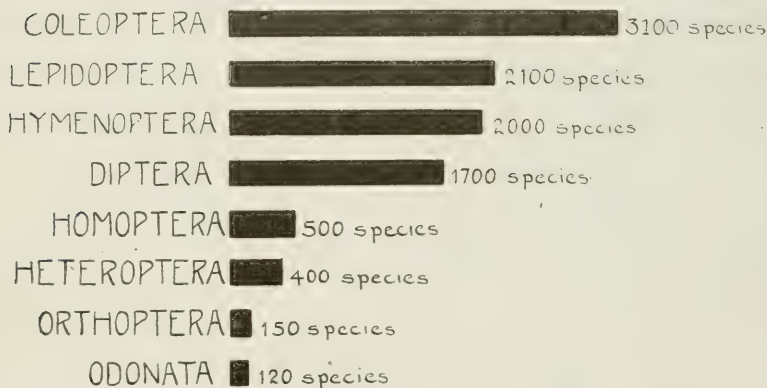


Fig. 29.—A comparison of New Jersey's Insect Orders.

is no reason why all entomologists should not use them wherever possible.

Figure 29 is a graphic comparison of the number of species of insects in some of the orders in New Jersey. Figure 30 is a similar comparison in which each order is represented by the sector of a circle. The bar method as shown in figure 29 is by far the most preferable. It is easier to read and the figures in round numbers at the right hand ends of the bars give the reader a chance to test the accuracy of the comparisons. All titles should be as full as possible and in large enough type to be easily read. Figure 30 is an example of the direct opposite of this. Many entomologists simply number their figures and have an explanation of the plate

at the end of their paper, and worse still is the practice of having the explanations scattered throughout the text. In many instances there is no real reason why the explanation and the figure



10530 SPECIES FOUND IN NEW JERSEY

Fig. 30.

should not appear on the same page. An author fails to realize that all readers do not share his burning interest in the question treated, and unless he can command their attention, sometimes in spite of themselves, he is likely to lose their interest.

Figure 31 is a bar method of comparing percentages. An illustration of this sort is easily read, and the reader can grasp readily the fact that 48 per cent. of the species of insects in New Jersey feed on vegetation and that 16 per cent. are predatory, and so on. The words "on vertebrates" should have been replaced by "injurious to vertebrates," as the former phrase is somewhat misleading. The shading of the large sections of the bar might also have been made more dense, to bring them out better. A chart of this kind is much more effective than a mere printed statement of the facts. Many readers do not grasp printed figures easily, and if you desire to reach this class you must visualize the facts for them.

Figure 32 needs practically no explanation. It is simply a graphic method of placing figures or amounts before a reader and

making them easy to compare. This chart would have been more effective and useful if the figures showing the actual amounts spent in the states had been placed at the ends of the bars, and if

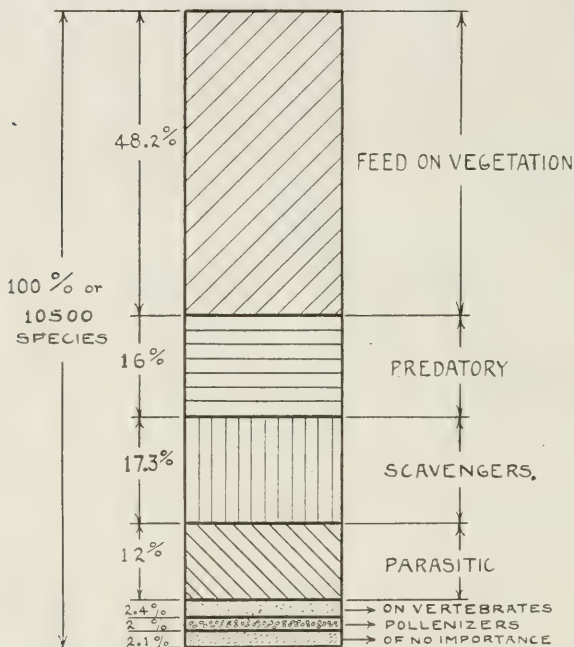


Fig. 31.—Activities of New Jersey Insects.

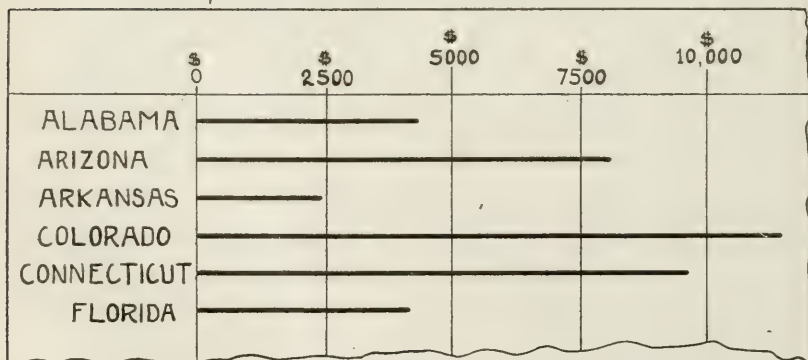


Fig. 32.—Money spent for entomological activities in 1912.

the figures in the horizontal scale were at the bottom. No importance should be attached to the amounts shown on this chart. They were taken from Prof. P. J. Parrott's paper in the Jour. Econ. Ent., Vol. 7, p. 57, simply for the purpose of illustration and should not be used without reference to Prof. Parrott's article.

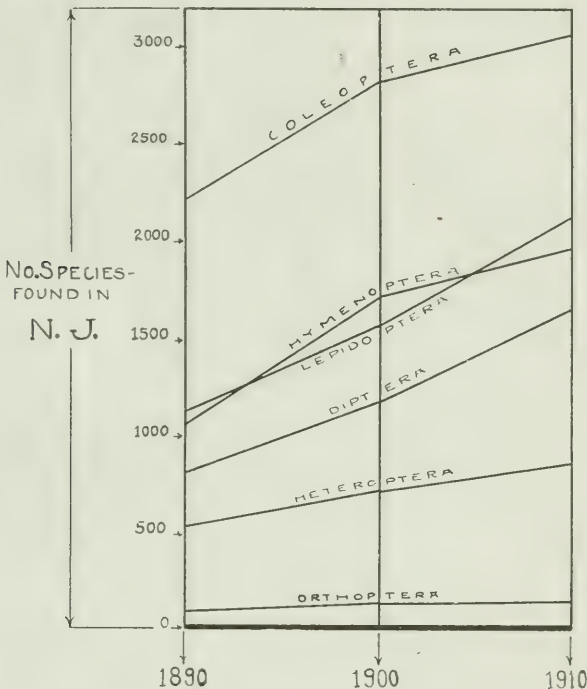
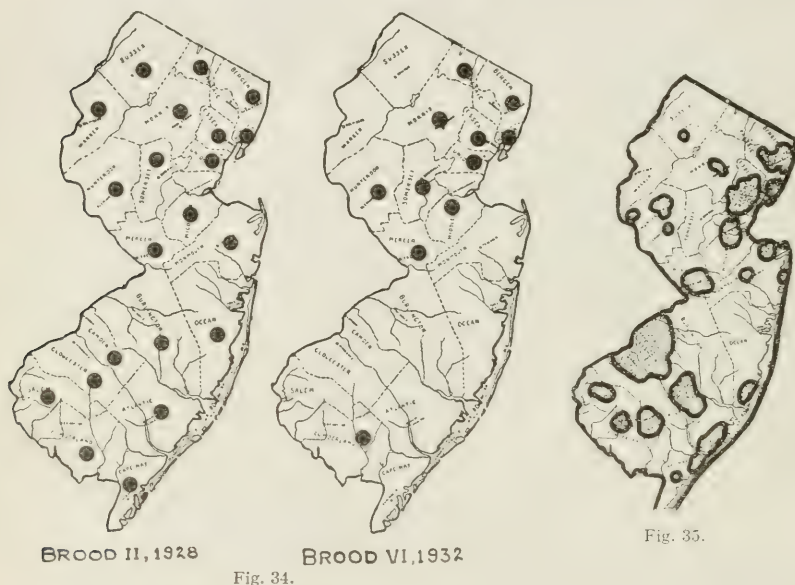


Fig. 33.—Additions to insects of New Jersey during 20 years (showing growth).

Figure 33 shows the growth, by means of comparative curves, in the knowledge of New Jersey's insects from 1890 to 1910 in ten year periods, this information having been obtained from Smith's *Insects of New Jersey*. The Coleoptera and Hymenoptera have run along somewhat parallel with respect to the number of additional species discovered during the twenty years from 1890 to 1910, and the largest part of this growth took place from 1890 to 1900. The Lepidoptera and Diptera show a steady upward trend, and the Heteroptera also, but at a slower rate. In charts

where the factor of time is considered, the earlier year should always appear at the left, and all vertical scales should read upward.

Figures 34 and 35 show map representations, which are common and convenient ways of charting certain kinds of information. Figure 34 illustrates the distribution by counties of two broods of



the Periodical Cicada in New Jersey. Distribution information should always be placed before a reader in a graphic way, as only in such a way can he grasp and visualize the material as a whole. Where necessary, the detailed printed information can accompany the chart, but it should never be used alone if one expects to convince the reader. Figure 35 shows the distribution of the nursery stock which entered New Jersey from other states during the fall of 1916. In order to bring the localities out more clearly, the dotted areas have been surrounded by heavy black lines. Both figures 34 and 35 are incomplete as to titles, which have been omitted purposely to show the ineffectiveness of such a procedure.

A good thing to remember in making graphic presentations and one which is often disregarded by entomologists, especially in their efforts to show the differences in yields between sprayed and unsprayed fruit trees by means of comparative drawings, is to have the presentation read from one dimension only and not to use areas and volumes which are so easily interpreted wrongly when quantities are represented. Inasmuch as many entomologists are familiar with curve plotting, no mention need be made of this method here, except to advocate its greater use. As stated before, this brief paper is merely suggestive, as are also the illustrations, which are not to be taken as examples, inasmuch as they are far from perfect. For a complete treatise on this subject, one is referred to "Graphic Methods for Presenting Facts" by Willard C. Brinton, published by the Engineering Magazine Company (New York City), a copy of which will be exceedingly useful to the entomologist who desires to present his material where possible in a convincing manner.

SOME PYRALID NOTES.

BY WM. BARNES, S. B., M. D. & J. McDUNNOUGH, PH.D., DECATUR, ILL.

In a recent number of the *Insecutor* (Vol. V, pp. 69 *et seq.*) Dr. Dyar has given some valuable critical notes on the Pyraustids and other Pyralids as listed in our Check List; one of our purposes in publishing this list was to elicit just such new records from our North American fauna as Dr. Dyar gives; without published records species indigenous to the territory embraced in our list may long remain unlisted, known only to a few individual curators or workers, and we trust that others who have further new records may be prevailed upon to follow Dr. Dyar's example.

We are also pleased to adopt Dr. Dyar's references of several of our apparently new species to older names given to West Indian or Central and S. American material; based as they are on a study of the large collections from this territory in the National Museum they may be presumed to be correct; we had already expressed the hope (*Contr.* II, (6) p. 223) that workers more favourably situated than ourselves would endeavour to align our names with those from more southerly points, and Dr. Dyar's efforts in thus

straightening out the synonymy are, therefore, to be commended; such work is instructive, not destructive.

With a few of Dr. Dyar's references we cannot wholly agree and offer the following notes in this connection.

Genus *Egesta* Rag.

Dr. Dyar has apparently not referred to Ragonot's original separation of the genus *Egesta* from *Homophysa* Led. (*Glaphyria*, Hbn.) which was made in his "Classification des Pyralites p. 24" and seemingly overlooked by Hampson in his later Classification. Ragonot separates the species *renalis* (the spelling later corrected to *reniculalis*, l. c., p. 213) and *eripalis* from the other species of his *Homophysinae* on the strength of veins 10 and 11 being *separate* and not *stalked*; this character is entirely disregarded by Dr. Dyar who bases his separation of the genera *Egesta* and *Glaphyria* solely on the length of the maxillary palpi. *Smyphysa* Hamp. (type *sulphuralis* Cram.) calls for the same venation as does *Egesta*, and for this reason was listed by us as a synonym; this may be incorrect and will need verification by a study of the type species from Brasil. In any case the genus *Egesta* must be used for our North American species, and in order to avoid any further confusion regarding its status we would specify the type as *reniculalis* Zell.; further subdivision of the two genera may be necessary when the length of the maxillary palpi of the various species is taken into consideration, but according to the primary division on the strength of veins 10 and 11 being stalked or separate we believe our arrangement will hold. The North American species of the genera *Glaphyria*, *Egesta* and *Lipocosma* (as listed by us) form a group which must probably sooner or later be separated from the *Pyraustinae* entirely; careful study will doubtless bring further structural details to light and lead to a more satisfactory grouping of the species, but until this can be done and done thoroughly we prefer to adhere to the general grouping as indicated.

Sameodes adipaloides G. & R.

Dr. Dyar believes that this name should be given varietal rank and would apparently apply it, as has generally been done, to a smaller, suffused form found in the Northern Atlantic States.

The only type of the species which we have been able to find is in the American Museum Collection, a ♂ from Pennsylvania, and this type unfortunately does not bear out the above conception but, although in poor condition, is clearly a straight synonym of *elealis* Wlk. The original description of *adipaloides*, especially the statement that the ground colour is a "rather bright clear yellow" would seem to show that the author's conception of the species is correctly illustrated by this type; on the other hand the figure given of a ♀ specimen (Tr. Am. Ent. Soc. I, Pl. II, fig. 19) rather points (except in ground colour) in the other direction, but as this figure is not a photograph certain inaccuracies may possibly be laid to the door of the artist. Whether, therefore, the identification of *adipaloides* should be based on the existing type, which would appear authentic, or on the figure is a delicate point for specialists to wrangle over; if the view supported in our list be correct then a varietal name may be necessary for the *adipaloides* of various authors, but we prefer to leave the matter to Dr. Dyar's judgment rather than propose a new name with the prospect of being accused later of rushing into print and overburdening the synonymy.

***Diasemia* (*Metasia*) *elegantalis* Warr.**

Dr. McDunnough when last at the British Museum, carefully examined Warren's type and compared it with specimens he had brought with him; we have a note stating that the British Museum series was mixed, and that Warren's type was in poor condition but was evidently the same species as that described later by Fernald as *argalis*; this is also borne out by Warren's description which states that the reniform is large and filled with lilac-gray; the type localities for both species are California and we have not seen the species from any locality outside of this State. The other species considered by Dr. Dyar to be *elegantalis*, following an erroneous determination of Prof. Fernald's, occurs in Arizona and is apparently nameless. We venture to describe it as follows:

***Diasemia disputalis*, sp. nov.**

Very similar to *elegantalis* Warr. but the ground colour of

primaries paler, the orbicular and reniform filled with rather shiny whitish and the latter smaller and much more constricted centrally, being almost divided into two equal triangular spots; beyond the t. p. line is a faint silvery band in costal portion of wing and a broader bluish patch between the bend and inner margin; the fringes are smoky in basal half, whitish outwardly. The secondaries are paler than in *elegantalis* with only faint, smoky suffusion outwardly and an obsolescent postmedian line. Expanse 20 mm.

Habitat.—Palmerlee, Ariz.; Tuscon, Ariz. Three ♂'s, 3 ♀'s. Types, Coll. Barnes.

***Pyrausta orphisalis* Wlk.**

Our note regarding the type says that it is close to *generosa* G. & R., so that it may very well equal *ochosalis* Dyar as suggested by Dr. Dyar; in our list we kept the name separate for want of further verification, believing that a name wrongly sunk in the synonymy is more likely to be overlooked than a synonym wrongly standing as a species.

***Cornifrons pulveralis*, Warr.**

Our note, after studying the type of this species and that of *simalis* Grt. side by side, says that the former is more even gray on primaries, with a less oblique t. a. line and with the secondaries paler; we are not at all sure that Dr. Dyar is correct in regarding the two as simply forms of one species; his action without further evidence than a study of Warren's description might at least be characterized as premature.

***Macrotheca interalbicalis* Rag.**

Our identification of this species as figured by us in Contr. I, No. 5, Pl. III, fig. 9 has been confirmed by a comparison of specimens with Ragonot's type in Paris; it would seem, therefore, that *vulnifica* Dyar (1917, Ins. Menst. V, 83) will fall as a synonym. Ragonot's figures of both this species and *baecalis* are distinctly poor; it is very probable that *vicarilis* Dyar will become a synonym of this latter species; the reference is, however, not absolutely certain but should be kept in mind.

A NEW GENUS AND SPECIES OF COCCIDÆ. (HEMIP.; HOMOP.).

BY G. F. FERRIS, STANFORD UNIVERSITY, CALIFORNIA.

Stomacoccus, new genus.

Coccidæ, referable to the tribe *Xylococcini* of the subfamily *Margarodinæ*, characterized, as are the other members of the subfamily, by the presence of legs in the first larval stage, the loss of these appendages in succeeding larval stages of the female, at least, and their reappearance in the adult female. Differing from any of the other members of the subfamily by the presence of mouth-parts in the adult female. Intermediate larval stages without an anal tube.

Type of the genus, *Stomacoccus platani*, n. sp.

Stomacoccus platani, n. sp.

Adult female 1.6 mm. long (on slide), of elongate form, with nearly parallel sides. In life of a deep yellow colour, without waxy secretion except for the fluffy ovisac in which the eggs are placed. *Antennæ* set close to the extreme anterior margin of the body with their bases nearly or quite touching, seven-segmented, the first segment large and stout, the second segment short and broad, the remaining segments becoming successively narrower and longer than the second with the seventh nearly as long as the first. *Legs* well developed, the anterior pair somewhat stouter than the others. Tarsal claw with at least six knobbed hairs arising near its base. *Body* apparently with no dorsal setæ, but with a pair of slender setæ at the base of each coxa and a median pair of such setæ on each ventral segment of the abdomen. *Pores* of wax-glands relatively few, concentrated toward the posterior end of the body, simple, surrounded by a chitinous ring. *Anal* opening on the dorsum of the last abdominal segment, very small, surrounded by a simple, chitinous ring. Eight pairs of spiracles present, two on the thorax and one on each of the first six abdominal segments.

Larva at first with legs and antennæ, the latter five-segmented, then losing these appendages and assuming a regularly oval form having much the appearance of some insect's egg. In life, of a

deep yellow or light brown colour, entirely devoid of secretion except for a few dorsal waxy filaments. Length of fully grown larva .5 mm. (on slide). Segmentation indistinct. Anal opening on dorsum at a slight distance from the posterior margin of the body, simple as in adult, without an anal tube. Tracheal system as in adult.

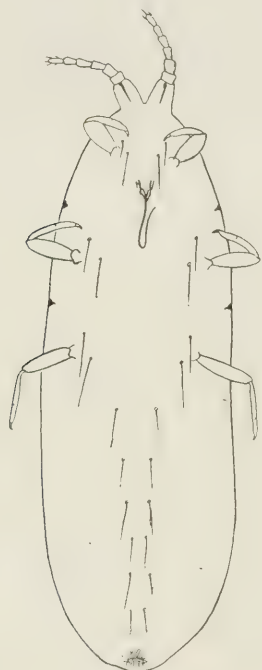


Fig. 36.—Adult female of *Stomacoccus platani*, n. sp.

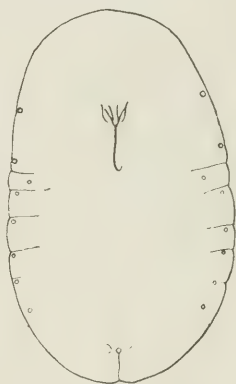


Fig. 37.—Larva of *Stomacoccus platani*, n. sp.

Adult male apterous, entirely devoid of waxy secretion, of a deep yellow colour. Antennae 10-segmented. Eyes simple.

Male pupa enclosed within a loose sac.

Male prepupa with mouth-parts, legs and antennae, the latter very short and stout, apparently eight-segmented. General form much like that of adult female. The earlier larval stages of the male have not been recognized and it is not known if there is an encysted stage, such as recorded by Hubbard and Pergande for the male larva of *Xylococcus betulae* Hub. and Perg.

Types.—Holotype, an adult female, allotype and paratypes of adults and larvæ in the collection of the Department of Entomology of Stanford University. Paratypes in the collections of Mr. H. S. Smith and Mr. E. O. Essig. Type locality, Stevens Creek, Santa Clara County, Calif.

Host and distribution.—On leaves, branches and trunk of *Platanus racemosa* (sycamore), Pasadena, Calif., and Stevens Creek, Santa Clara Co., Calif.

This is the only species of *Margarodina* as yet recorded in which the mouthparts are retained in the adult female, a fact that seems amply to justify the naming of a new genus. The adult female appears, aside from the possession of mouth-parts, to approach most closely the genus *Steingelia* Nasonow, a genus

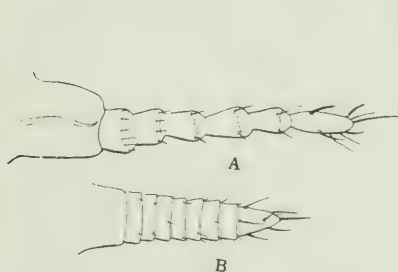


Fig. 38.—A.—Antenna of adult female of *Stomacoccus platani*, n. sp. B.—

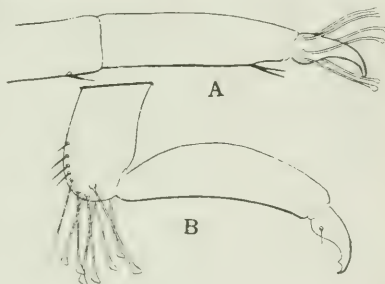


Fig. 39.—A.—Tarsus and portion of tibia of adult female of *Stomacoccus platani*, n. sp. B.—Tarsus and part of tibia of adult female of *Kuwania quercus* (Kuw.).

of two species, one of which, *S. gorodetskia* Nass., occurs in Russia (host not recorded) and the other *S. brittanica* (Green) on birch in England. The latter species was referred by its author to the genus *Kuwania* Ckll., but it is obviously not very closely related to the type species, *K. quercus* (Kuw.) as cotype specimens of the latter before me show, the most significant differences being in the structure of the legs. Whether it is a synonym of *S. gorodetskia* Nass., as suggested by Sassi in his Catalogue of Recently Described Coccidæ for 1915, can hardly be determined without knowledge of the larval forms which is lacking in the case of both these species.

Credit for the discovery of the species here described is due Dr. A. G. Smith, of Pasadena, who forwarded specimens to Mr.

H. S. Smith, of the State Commission of Horticulture of California. These specimens were forwarded to Mr. E. O. Essig and received from him by the author. Upon its appearing that the species was new Mr. Essig and Mr. H. S. Smith resigned their rights to it, and Mr. Smith procured an additional supply of material. To these gentlemen are due the fullest thanks for their kindness. A search by the author then revealed the species in the vicinity of Stanford University, a region that still continues to yield new forms and records in spite of years of assiduous collecting on the part of numerous workers.

The life history has been followed for but a short time, but this is sufficient to indicate its general course. The insect occurs either on the bark or on the leaves, probably passing the winter on the former and then going out to the leaves. The presence of adult males and females, mingled with all the immature stages, on leaves scarcely a month old indicates that the life cycle is quite short. The immature stages are attached solely by the beak and are entirely exposed either upon the under side of the leaves or upon the bark. The adult females seek the protection of bark scales when present but may form their ovisacs in the open, sometimes remaining even partially within the exuvium of the preceding stage although they are quite active. The males are very active and have been observed apparently attempting to copulate with females that were still in the appendageless state.

SOME SENSORY STRUCTURES IN THE APHIDIDÆ.

BY A. C. BAKER, WASHINGTON, D.C.

During the writer's studies on aphids he has had occasion to notice certain sensory structures on the wings and legs of these insects. These structures vary in the different groups, and since scarcely any references to them appear in the literature of the family the writer here records some of his observations. The pores on the legs are recorded in technical descriptions of species of *Chermes*, but those present on the legs of insects in other genera and on the wings appear not to be referred to in descriptions. Vickery* has mentioned the presence of pores on the legs. No experiments

*Rept. of State Ent. of Minn., 1907-08, p. 178.

have been conducted by the writer to indicate the nature of these organs, but they appear in structure quite similar to the sensoria of the antenna in the genus *Aphis*. They are small circular or oval structures composed of an outer rim and a middle pore-like centre. Each organ is often surrounded by an irregular or oval area which is differentiated from the surrounding chitin. The organs occur near the base of the wings on the thickened origin of the subcosta and radius, scattered along the area between these veins and on the trochanters and bases of the femora. None seems to be present on other portions of the legs. The species examined are arranged under their respective genera.

Genus *Lachnus*.

Besides the presence of many small pores near the base of the femur in species of this genus, larger ones, more or less tuberculate are sometimes also present in *ponderosa* Wms. (fig. 39) and *L.* sp. (fig. 40). *Curvipes* Patch (fig. 41) does not seem to possess any of these large pores. Another species (fig. 32) shows a broken group. Members of this genus also possess usually a group of small pores near the base of the hind wing as in *curvipes* (fig. 42) and *ponderosa* (fig. 43).

Genus *Essigella*.

Essigella californicus Essig. does not possess the group of small pores present in species of *Lachnus* examined, but the femora are provided with only two moderate sized ones near the base (fig. 44).

Genus *Symydobius*

S. oblongus Heyden seems to have none of these organs upon the wings. There are three or four however upon the femur, and about the same number upon the trochanter (fig. 20).

Genus *Myzocallis*

Members of this genus as well as other members of the tribe, have as a rule only a few pores situated at the base of the femur, for example, *M. alnifoliae* Fitch (fig. 47) and *M. bella* Walsh (fig. 48). They have no definite group on the wings but sometimes a few scattered pores on the subcosta.

Genus *Drepanaphis*.

D. acerifolii Thos. possesses a few small pores upon the subcosta. On the femur there are usually two large pores which are

very distinct (fig. 31). They are more prominent upon forms taken in the summer than in the spring forms.

Genus *Pterocomma*.

All the species of this genus show the same character of these organs. There is a large group of very small pores close to the base of the femur. *Populifoliae* Fitch (fig. 33) and *smithiae* Mon. (fig. 34) show very compact groups. *Salicis* L. (fig. 35) shows numerous pores upon the trochanter and a group of nine or ten near the base of the fore wing (fig. 36). *Bicolor* Oest., (fig. 37) has a similar group upon the femur.

Genus *Trichosiphum*.

One species of this group has been examined and it possesses one large pore near the base of the femur (fig. 46).

Genus *Aphis*.

There is considerable variation met with in this genus. Most species have two or three of these organs at the base of the femur. *A. coreopsidis* Thos. (fig. 21) has a group of four or five at the base of the femur. *A. gossypii* Glover (fig. 32) is quite similar as is also *A. viburnicola* Gill (fig. 45). *A. madiradicis* Forbes shows a group near the base of the fore wing (fig. 22) and a group of four or five at the base of the femur. *A. middletoni* Thos., shows a group near the base of the fore wing (fig. 24), and about five near the base of the femur (fig. 25). It will be remembered that these last two species are subterranean. *A. maidis* Fitch, shows one of the deepest pores seen on any species (fig. 26). This huge pore is, however, not present on every specimen. The same thing is sometimes met with in species of *Lachnus*.

Genus *Myzus*.

Myzus cerasi Fab. shows one or two pores at the base of the femur, and *M. plantaginis* Fab., has a group of about four near the base of the hind wing (fig. 28).

Genus *Matrosiphum*.

M. circumflexum Buckton, possesses a scattered group of about six small pores on the femur (fig. 27). None is found upon the wings, or if so a few small ones along the subcosta. *M. ambrosiae* Thos., has one pore at the base of femur and a few minute ones along the subcosta of the wing.



Genus *Toxoptera*.

T. graminum Rond. possesses three or four large pores at the base of the femur quite similar to those met with in the genus *Aphis*.

Genus *Rhopalosiphum*.

R. rhois Mon. possesses about six pores at the base of the femur but these are considerably scattered (fig. 29). Another species examined possesses four near the base (fig. 30).

Genus *Anoecia*.

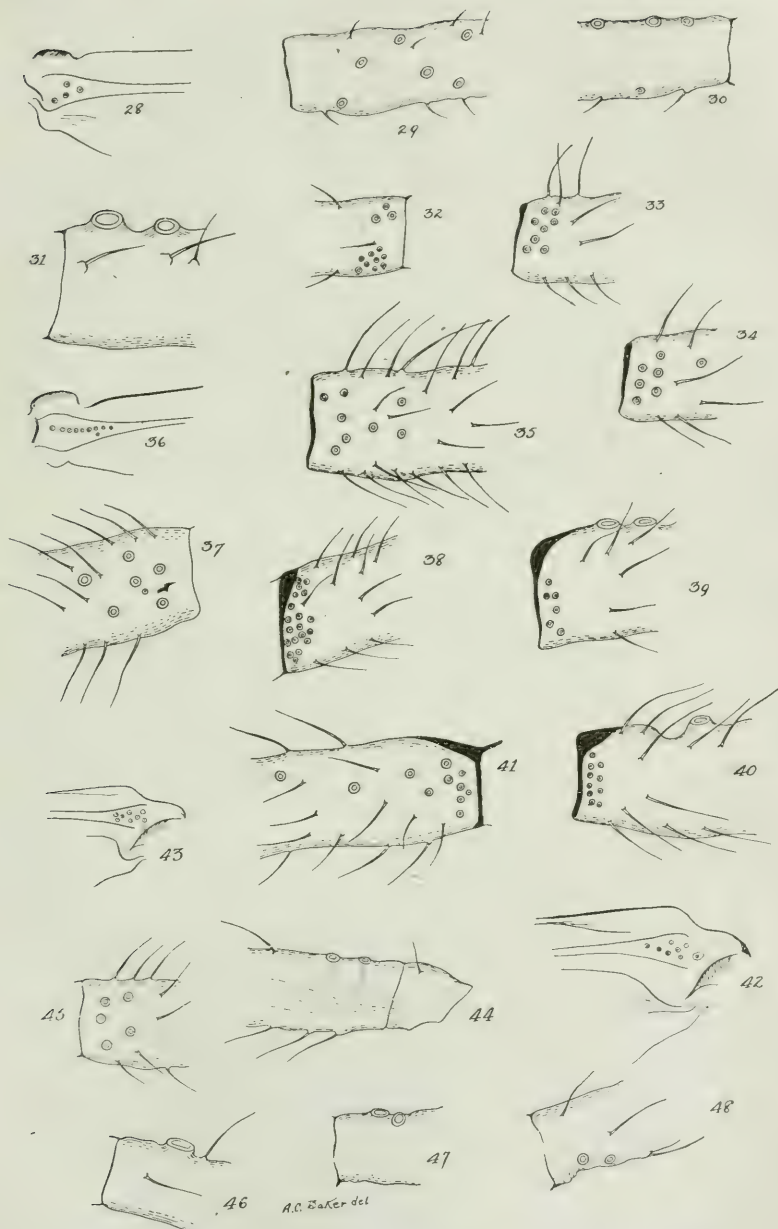
Two species of this genus *querci* Fitch., and *corni* Fab. were examined. Fall migrants were used in both cases. Both showed about the same group of six to ten near the base of the fore wing, but the organs of the femur are different. *Querci* Fitch shows a row of four or five extending about one-quarter of the way along the segment, whereas *corni* gave a group of six or seven near the the base (Fig. 14).

Genus *Eriosoma*.

E. americanum Riley shows a group of three to nine pores at the base of the fore wing (Fig. 17). These are surrounded by irregularly shaped areas (Fig. 18). There are about three present, usually at the base of the femur and usually three at the base of the hind wing. *E. pyricola* B. & D., has a group somewhat larger near the base of the fore wing (Fig. 19), and some four or five also along the subcosta.

Genus *Prociphilus*.

Several species of this genus were studied and they proved to be all quite similar as far as these organs are concerned. *P. bumulae* Sch., possesses a group of about 18 pores at the base of the hind wing (Fig. 9) and a few scattered along the subcosta of the fore wing. The base of the femur has another group of about eight pores (Fig. 10). *P. pyri* Fitch is very similar to *bumulae* as far as the wings are concerned, there being a group of about 15 at the base of the hind wing. The group on the femur is a little more scattered in *pyri* (Fig. 11) and several are seen on the trochanter. *P. imbricator* Fitch has a group of about fifteen at the base of the hind wing (Fig. 12), and a scattered group of about six on the proximal end of the femur. There are also two or three near the base of the fore wing.



Genus Thecabius.

Thecabius affinis shows a large group arranged in more or less of a row near the base of the fore wing. Two or three only are present near the base of the femur (Fig. 13).

Genus Pemphigus.

Several species of this genus were studied and they all showed a considerable number of pores. *P. populicaulis* Fitch has a series of nine or ten at the base of the hind wing (Fig. 5), and about three on the fore wing. The base of the femur in this species is armed with a group of five or six and two or three are present on the trochanter (Fig. 6). Another species of this genus taken in Colorado shows a similar group, but about a dozen are present on the fore wing (Fig. 7). These are surrounded by oval or elongate transparent areas (Fig. 8). The individuals of this second species were taken underground.

Genus Colopha.

C. ulmicola Fitch possesses a group of five or six in an even row near the base of the fore wing (Fig. 16).

Genus Hormaphis.

H. hamamelidis Fitch, possesses a series of about a dozen small pores. Scattered near the base of the wing none was observed on the legs.

Genus Phylloxera.

Two species of this genus were examined, *caryæcaulis* Fitch and *castaneæ* Hald. Both showed the same character of the grouping of the pores. These occurred near the base of the fore wing in a rather compact group, *caryæcaulis* (Fig. 1) and *castaneæ* (Fig. 2). The legs seem to show no small pores, but some specimens of *castaneæ* possess one large pore (Fig. 3).

It will be seen from the foregoing tabulation that species living underground and those inhabiting galls possess upon their wings more of these structures than the free-living solitary forms. In fact many of the latter have none upon the wings at all. This applies also to those present upon the legs. Species living underground possess them, as a rule, in more abundance than their near relatives which are not subterranean. This will be noted in the genus *Aphis*. In some genera, however, such as the genus *Lachnus*, the aerial forms have these structures in quite large numbers on the legs.

NEW COLEOPTERA. VII.

BY H. C. FALL, PASADENA, CAL.

In view of the possible appearance in the not distant future of a synopsis of the North American species of *Conotrachelus*, it is thought best to present at this time descriptions of two new species, which have been drawn up for some time. With these are submitted descriptions of what appear, with present light, to be five new species of *Ceutorhynchus*. It is rather remarkable that four of the five were taken at the same place—Aweme, Manitoba—and all in the same month, by Mr. Norman Criddle, who has sent them to me for determination. Types of all the above are in my collection.

CONOTRACHELUS SCH.

***Conotrachelus biscaynensis*, n. sp.**

Form approaching that of *anaglypticus*, but with the prothorax somewhat wider and the elytra a little less robust. Colour piceous, the beak and tibiae dark rufous; vestiture consisting of rather narrow to linear appressed scales, mostly brownish fulvous in colour and irregularly dispersed, with a few, usually broader, creamy white scales aggregated in very small spots, mostly along the elytral costae. Head coarsely punctate, with a small, inconspicuous frontal fovea; beak about two-fifths the length of the body, polished and very sparsely, finely punctate apically, lightly sulcate at sides posteriorly; antennae inserted at apical third. Prothorax a little wider than long, sides parallel and straight in about basal half, thence a little oblique nearly to the apical constriction; surface coarsely, densely cribrate punctate, median line imperfectly and incompletely carinate. Elytra one-half wider at base than the thorax, sides feebly sinuate for a short distance at base, becoming widest at about basal third, thence arcuately narrowing to apex; strial punctures rather coarse, intervals 3, 5, 7, 9 acutely carinate throughout. Mesosternum not protuberant; metasternum grossly punctate; first ventral similarly, coarsely but still more sparsely so, following segments broadly smooth and polished at middle, punctate only at sides, last segment unmodified. Femora obscurely annulate and unidentate.

Length 4.1 mm.; width 2.2 mm.

November, 1917

Biscayne, Florida, May 14. (Hubbard and Schwarz). A single specimen, probably a female, is before me. By LeConte's table it would fall near *germinatus*, but it does not at all resemble the latter. In general aspect it is very similar to *floridanus*, but is less elongate and with very differently punctured ventral segments.

***Conotrachelus obesus*, n. sp.**

Form of *anaglypticus* but with a relatively wider thorax; piceous, vestiture not well preserved, consisting, so far as visible, of very small, short, appressed dirty white scales or squamiform hairs on the elytra, and short squamiform setae within the coarse punctures of the prothorax. Head densely punctate, more coarsely so in front at the base of the beak, the latter stout, not longer than the prothorax, carinate and sulcate as in *anaglypticus*. Prothorax slightly broader than long, sides parallel and nearly straight in basal two-thirds, surface very coarsely, densely cribrate punctate, median line not carinate, but with a short, narrow, smooth line behind the middle, and two short, parallel raised lines or crests in front. Elytra five-eighths wider than the prothorax, three-tenths longer than wide, with striae of coarse punctures; intervals 3, 5, 7, 9 acutely carinate, the carinae of the third and fifth abruptly interrupted before the middle, but not at all so posteriorly. Mesosternum moderately coarsely punctate, protuberant in front. Ventral segments opaque, rather coarsely but not very densely punctate. Legs stout, annulate; femora with a stout, triangular tooth and a small denticle.

Length 5 mm.; width 2.8 mm.

Georgia.—A single example of unknown sex. It is impossible to say from the type whether the elytra when in perfect condition, are as completely clothed as in *anaglypticus*, but it seems probable that this is the case, as the two species are closely allied in most respects. The present species is larger than *anaglypticus*, which differs notably by its non-interrupted elytral costae.

CEUTORHYNCHUS GERM.

***Ceutorhynchus echinatus*, n. sp.**

Moderately broadly oval, convex, piceous, sides of elytra gradually brunnescent, legs dull rufous, elytra conspicuously

tuberculate and hispid. Antennæ brownish piceous, scape and basal joint of funicle pale, base of club also paler and subglabrous; funicle 6-jointed, second joint a little shorter than the first, fully twice as long as wide; third joint three-fourths as long as the second; fourth, fifth and sixth subequal, each a little shorter than the third and slightly longer than wide; club as long as the preceding four joints, ovate-pointed. Head coarsely, densely cribrate punctate, a short occipital carina; beak rather stout, as long as the prothorax, striate basally and densely, coarsely punctate and hispid throughout; antennæ inserted slightly beyond the middle. Prothorax about one-fifth wider than long, sides parallel in basal third, broadly constricted in front, apex a little more than one-half as wide as base, apical margin scarcely sinuate at middle, median sulcus narrow, moderately deep posteriorly, evanescent in front, lateral tubercles small but acute, vestiture of interningled fine white and blackish setæ, the former less erect, the latter bristling but more or less recurved, and with small patches of elongate, appressed white scales at the hind angles at base of median sulcus. Elytra about as wide as long, sides feebly rounded and subparallel basally; striæ moderate, intervals each with a single series of strongly elevated, shining tubercles, which are acute when viewed laterally, but with transversely arcuate outline when viewed from behind, each bearing at its summit a long, blackish, erect but recurved seta. The surface is also clothed sparsely throughout with shorter, more inclined white hairs; a short linear patch of white scales at the base of the suture. Body beneath coarsely, densely punctured, the sternal side pieces albo-squamose, the ventral segments with intermixed, whitish scales and erect, dark hairs, the former predominating at the sides. Legs moderate, the femora armed with a very small acute tooth; ungual teeth approximate, and very nearly as long as the claws.

Length 2.5 mm.; width 1.5 mm.

Aweme, Manitoba, Sept. 25, on *Heuchera hispida* (Criddle). The type is a male, having all the tibiæ strongly unguiculate, and the last ventral with a rather shallow median fovea, with its lateral margins somewhat elevated posteriorly.

This remarkable little species does not in all respects look like a *Ceutorhynchus*, but I am unable to refer it elsewhere. It may be placed near *sulcipennis* and *decipiens* for the present.

***Ceutorhynchus invisus*, n. sp.**

Oval, convex, black, thinly clothed above with appressed, hair-like scales, grayish to pale brownish in colour, rather inconspicuously condensed in a narrow, basal, sutural spot, and at the base of the pronotal sulcus, and arranged on the elytral interspaces in two or three somewhat irregular series; the scales of the elytral striae are just visibly coarser and more uniformly whitish. Antennae entirely piceous, funicle 7-jointed, funicular joints gradually shorter, the second scarcely twice as long as wide, inserted at the middle of the beak (σ^7). Beak very little longer than the prothorax, striate and punctate basally, more sparsely punctured and shining apically. Prothorax one-fifth wider than long, moderately narrowed and constricted anteriorly, front margin entire, median line sulcate, lateral tubercles small, obtuse, surface shining and densely, coarsely punctate. Elytra across the humeri four-ninths wider than the prothorax, scarcely one-fourth longer than wide, gradually narrowed from the humeri, intervals rugose, nearly flat, twice as wide as the striae, declivity with some acute granules. Body beneath more closely clothed with broader grayish white scales. Legs moderate, femora toothed, claws with an acute-basal tooth rather approximate to its fellow.

Length 2.35 mm.; width 1.4 mm.

Aweme, Manitoba, Sept. 23. (Criddle).

The type is a male, having the last ventral distinctly foveate, the sides of the fovea not elevated, the four posterior tibiae distinctly unguiculate.

Using Dietz' table of groups, one is uncertain whether to refer this species to the *subpubescens* or *sulcipennis* group, since the vestiture is neither dense, nor very sparse. Blatchley and Leng unite these two groups in their own Group "A," and by their table the present species would seem to fall between *marginatus* and *sulcipennis*, differing from the former by its smaller size and shorter basal tooth of claws, and from the latter, among other characters, by the less deeply sulcate elytra with much less rugose intervals.

***Ceutorhynchus omissus*, n. sp.**

Oval, black, opaque, clothed not densely above with short,

whitish, piliform scales, which become broader and more numerous in the median thoracic sulcus and along the base of the thorax, also obscurely so at the base of the elytral suture. Antennae piceous, second funicular joint elongate, the third about two-thirds as long as the second. Beak slender, arcuate, serially punctate at sides basally, finely punctulate and shining above and apically, the punctures showing a tendency to unite longitudinally. Antennae (♀) inserted slightly behind the middle. Head closely punctate. Thorax moderately transverse, gradually narrowed from the base, broadly constricted apically, anterior margin feebly subsinuate at middle, punctuation dense, moderately coarse, median line distinctly impressed, lateral tubercles small. Elytra about one-fourth longer than wide, widest across the humeri, gradually narrowed posteriorly, rather finely striate, intervals twice as wide as the striae, rugose, each with a double line of appressed piliform scales; declivity with some acute granules. Body beneath closely, coarsely punctate, each puncture bearing a more or less elongate white scale; last ventral with a rather shallow, median fovea. Legs rather slender, femora unarmed, last tarsal joint projecting a distance subequal in length to the lobes of the preceding joint, claws with an acute basal tooth subapproximate to its fellow.

Length 2.4 mm.; width 1.3 mm.

Aweme, Manitoba, Sept. 23, (Criddle).

This species belongs to the *convexicollis* group, and may precede *mutabilis*, from which and *ovalis* it differs in its narrow, piliform vestiture.

***Ceutorhynchus moznettei*, n. sp.**

Oblong oval, moderately convex, piceous, vestiture above consisting of small, not densely placed, brownish piliform appressed scales, with broader white scales condensed in a baso-sutural spot, and in the pronotal-sulcus; a few similar scales along the basal margin of the elytra, about the elytral apex and scattered singly very remotely over the elytral disk; body beneath rather densely grayish squamose. Antennae piceous, inserted just perceptibly beyond the middle of the beak; funicle 7-jointed, second joint slender, but little shorter than the first, fully three times as long

as wide, and subequal to the next two. Head densely punctate, front concave, vertex finely carinate. Beak moderate, striate and punctate as usual. Prothorax moderately transverse, sides arcuately subparallel basally, surface densely punctate, median channel distinct, deeper behind, lateral tubercles obtuse. Elytra distinctly longer than wide, broadly arcuately narrowed posteriorly; striae fine; intervals broad, flat, each with three or four more or less irregular series of small, hair-like scales. Legs moderate, thighs unarmed, feebly annulate with whitish scales. Claws with a rather small but acute basal tooth.

Length 2.9 mm.; width 1.75 mm.

Corvallis, Oregon, (Moznette).

The type is a male, having the last ventral distinctly foveate, and the middle and hind femora unguiculate.

This species must be placed near *mutabilis* Dietz. The latter is a smaller species, with coarser, less appressed vestiture, the broader scales of the upper surface much more numerous.

***Ceutorhynchus convexipennis*, n. sp.**

Oval, black, moderately shining, thinly clothed above with short, white appressed hairs which are somewhat coarser on the elytra, where they are disposed in nearly single series on the intervals, as well as in the striae. Antennae entirely piceous, funicle 7-jointed, first and second joints subequal in length, following joints gradually shorter. Beak rather slender, evenly arcuate, shining, sparsely punctate and lightly striate at sides basally; more sparsely, finely and irregularly punctate above and apically; antennae inserted at about the middle (♀?). Head densely, evenly punctate. Prothorax coarsely, densely punctate, the punctures round and nearly in mutual contact; base much wider than the apex, sides parallel in nearly basal half, broadly constricted apically, anterior margin not emarginate, lateral tubercles small, acute. Elytra sub-oval, strongly convex, two-sevenths wider than the prothorax and a little more than one-fourth longer than wide, widest at basal fourth; striae moderate, intervals a little wider than the striae, only slightly convex, surface feebly rugose, some small, acute granules on the declivity. Body beneath coarsely, closely punctate, each puncture bearing a white scale, the scales a little

broader and more approximate on the sternal side pieces. Legs rather slender, femora not toothed, terminal joint of tarsi projecting a distance rather less than the length of the lobes of the preceding joint; claws simple.

Length 1.8 mm.; width .9 mm.

Aweme, Manitoba, Sept. 8, (Criddle).

A small species belonging to the *squamulatus* group of Dietz, in which it may best follow *persimilis*, though not agreeing closely with any species of the group. The small size and lack of true scales on the upper surface distinguishes it from all but *albopilosulus*, which differs in its erect, coarser vestiture among other characters.

LECTOTYPES OF THE SPECIES OF HYMENOPTERA
(EXCEPT APOIDEA) DESCRIBED BY ABBÉ
PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D.C.

(Continued from page 336.)

Coccophagus brunneus. Type.—Yellow label 1384. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Coccophagus compressicornis. Type.—Harrington Coll.

Coccophagus pallipes. Type.—Yellow label 1389; blue 783(s). 2nd Coll. Pub. Mus., Quebec. Head gone.

Coleocentrus mellipes. Type.—Not located.

Coleocentrus quebecensis. Type.—Not in Pub. Mus., Quebec., unless under *C. pettiti* Cress.

Coleocentrus rufus. Type.—Female, yellow label 456. 1st Coll. Pub. Mus., Quebec.

Copelus paradoxus.—See *Helorus*.

Copidosoma pallipes. Type.—Harrington Coll.

Crabro aciculatus. Type.—Female, yellow label 813. 2nd Coll. Pub. Mus., Quebec. Male, allotype, without label.

Crabro niger. Type.—Female, blue-green label 852(s), yellow label 1660. 2nd Coll. Pub. Mus., Quebec.

Crabro 4-maculatus. See *C. 4-punctatus*. Type the same specimen.

Crabro 4-punctatus. Type.—Female, yellow label 807. 2nd Coll. Pub. Mus., Quebec. See *C. 4-maculata*. See Fauna p. 654 and table 653, both names used.

Cratospila aciculata. Type.—No specimen. Pin with name label. 2nd Coll. Pub. Mus., Quebec. Probably returned to collector.

Cratospila brevicauda. Type.—Female, yellow label 1273. 2nd Coll. Pub. Mus., Quebec. Lacks apex of left flagellum.

Cratospila caudata. Type.—Female, yellow label 606. 2nd Coll. Pub. Mus., Quebec. Lacks flagella.

Cremastus fusiformis. Type.—Female, yellow label 306. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at apex.

Cremastus longicaudus. Type.—Female, yellow label 1050. 2nd Coll. Pub. Mus., Quebec.

Cremastus mellipes. Type.—Female, yellow label 363. 1st Coll. Pub. Mus., Quebec. Antennæ broken near middle; fore wings gone; badly pinned. Female. 2nd Coll. antennæ broken.

Cremastus rectus. Type.—Yellow label 361. 1st Coll. Pub. Mus., Quebec. Left antenna at scape, left hind leg at coxa and abdomen gone.

Cremastus royi. Type.—Female, yellow label 674. 2nd Coll. Pub. Mus., Quebec.

Cryptus affabilis. Type.—Female, yellow label 258. 2nd Coll. Pub. Mus., Quebec.

Cryptus albonotatus. Type.—Not located.

Cryptus amblytelarius. Type.—Female, yellow label 1204. 2nd Coll. Pub. Mus., Quebec.

Cryptus annulatus. Type.—Female, yellow label 291. 1st Coll. Pub. Mus., Quebec. Lacks right fore wing.

Cryptus apicatus. Type.—Female, yellow label 246. 2nd Coll. Pub. Mus., Quebec. Lacks right antenna.

Cryptus belangeri. Type.—Not in Pub. Mus., Quebec, unless under name *C. nuncius* Say. One specimen.

Cryptus brevicornis. Nat. Can., Vol. 7, p. 176.—See *Phygadeuon impressus*.

Cryptus brevicornis. Of index p. 432. Type.—Female, old rose label 79; yellow label 1202. 2nd Coll. Pub. Mus., Quebec.

Cryptus canadensis. Type.—Male, yellow label 248. 2nd Coll. Pub. Mus., Québec. Lacks left antenna.

Cryptus certus. Type.—Not in Pub. Mus., Quebec, unless under name *C. fungor* Nort. Two damaged specimens.

Cryptus cinctus. Type.—Male, yellow label 292. 1st Coll. Pub. Mus., Quebec. Lacks apex of right antenna.

Cryptus circumcinctus. Type.—Male, yellow label 516. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ.

Cryptus collaris. Type.—Male, blue label 121, yellow label 1206. 2nd Coll. Pub. Mus., Quebec.

Cryptus dubius. Type.—Not in Pub. Mus., Quebec. Probably returned to collector. (Geddes).

Cryptus eburneifrons. Type.—Male, yellow label 517. 2nd Coll. Pub. Mus., Quebec. Lacks most of antennæ.

Cryptus elongatus. Type.—Male, yellow label 670. 2nd Coll. Pub. Mus., Quebec. Lacks apices of antennæ and hind legs.

Cryptus erythropygus. Type.—Not in Pub. Mus., Quebec. Probably in Harrington Coll.

Cryptus exilis. Type.—Male, yellow label 283. 1st Coll. Pub. Mus., Quebec.

Cryptus flavipectus. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon scitulus* Cress.

Cryptus fletcheri. Type.—Female, white label 115; also "*Cryptus* ♀ *fletcheri* Prov. Type.—Victoria, V. I." in hand other than Provancher's. 2nd Coll. Pub. Mus., Quebec.

Cryptus gracilis. Type.—Not in Pub. Mus., Quebec. Probably in Harrington Coll.

Cryptus ignotus. Type.—Male, Harrington Coll. Pink label "P 423." Part of left antenna gone.

Cryptus imitator. Type.—Female, yellow label 296. 1st Coll. Pub. Mus., Quebec.

Cryptus incognitus. Type.—Blue label 39; yellow label 1205. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum.

Cryptus insignis. Type.—Not in Pub. Mus., Quebec, unless under *Phygadeuon blakei* Cress.

Cryptus latus. Type.—Not in Pub. Mus., Quebec, unless under *Phygadeuon occidentalis*.

Cryptus linearis. Type.—Male, old rose label 49. Yellow label 1207. 2nd Coll. Pub. Mus., Quebec. Part of antennæ gone.

Cryptus longicaudus. Type.—Female, Harrington Coll. Pink label "P. 375."

Cryptus mellicoxus. Type.—Male, yellow label 1209. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone; abdomen glued on number label.

Cryptus mellipes. Type.—Female, Harrington Coll. Pink label "P. 392." Abdomen wanting, wings except left hind wanting.

Cryptus montivagus. Type.—Female, yellow label 251. 2nd Coll. Pub. Mus., Quebec. Lacks most of flagella.

Cryptus mundus. Type.—Male, yellow label 245. 2nd Coll. Pub. Mus., Quebec. Lacks part of antennæ and right hind leg.

Cryptus nigricornis. Type.—Male, yellow label 294. 1st Coll. Pub. Mus., Quebec. Lacks left antenna beyond 4th joint.

Cryptus nigricoxus. Type.—Male, yellow label 1553. 2nd Coll. Pub. Mus., Quebec.

Cryptus notatus. Type.—Male, yellow label 254. 2nd Coll. Pub. Mus., Quebec.

Cryptus occidentalis.—See *Phygadeuon occidentalis*.

Cryptus ornatus. Type.—Not in Pub. Mus., Quebec.

Cryptus osculatus. Type.—Male, yellow label 281. 1st Coll. Pub. Mus., Quebec. Lacks right flagellum.

Cryptus pentagonalis. Type.—Harrington Coll. Male, pink label 425. Female, pink label 431.

Cryptus perditus. Type.—Male, Harrington Coll. Pink label "P. 442." Lacks antennæ and right fore wing; other wing folded and hard to see.

Cryptus pubescens. Type.—Male, Harrington Coll. Pink label "P. 424."

Cryptus quebecensis. Type.—Not in Coll. unless under name *Ichneumon velox* Cress. Two females. 1st Coll. fair.

Cryptus rectus. Type.—Male, yellow label 1208. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum.

Cryptus ruficornis. Type.—Male, yellow label 519. 2nd Coll. Pub. Mus., Quebec. Some verdigris.

Cryptus rufoannulatus. Type.—Female, yellow label 286. 1st Coll. Pub. Mus., Quebec.

Cryptus rufus. Type.—Male, yellow label 259. 2nd Coll. Pub. Mus., Quebec. Lacks right flagellum.

Cryptus scutellatus. Type.—Male, yellow label 282. 1st Coll. Pub. Mus., Quebec. Lacks apices of antennae some tarsi, and abdomen has been glued on.

Cryptus segregatus. Type.—Male, Harrington Coll. Pink label "P. 422."

Cryptus sericeifrons. Type.—Female, yellow label 515. 2nd Coll. Pub. Mus., Quebec. Most of flagellum gone. No male in Coll.

Cryptus signatus.—See *Phygadeuon signatus*.

Cryptus sordidus. Type.—Female, Harrington Coll. Pink label "P. 373." Abdomen off but glued on card.

Cryptus soriculatus. Type.—Male, yellow label 697. 2nd Coll. Pub. Mus., Quebec. Lacks right antenna.

Cryptus spissicornis. (Addit. 1886, p. 68, not suppl. p. 361). Type.—Not in Pub. Mus., Quebec, unless under *Cryptus crassicornis* of which there is one specimen agreeing with description of *spissicornis*.

Cryptus spissicornis. (1888, suppl. p. 361 not Addit., 1886, p. 68). Type.—Female, yellow label 1582. 2nd Coll. Pub. Mus., Quebec.

Cryptus 3-annulatus. Type.—Not in Pub. Mus., Quebec. Probably in Harrington Coll.

Cryptus varius. Type.—Not in Pub. Mus., Quebec, unless under name *Cryptus atricollaris* Walsh.

Cteniscus apicatus. Type.—Male, yellow label 341. 2nd Coll. Pub. Mus., Quebec. Lacks antennae.

Cteniscus concolor. Type.—Female, yellow label 321. 2nd Coll. Pub. Mus., Quebec. Under name *Mesoleptus concolor* Cress. Lacks most of antennae.

Cteniscus crassipes. Type.—Not in Pub. Mus., Quebec. Probably returned to collector.

Cteniscus rufus. Type.—Public Mus., Quebec. Data from pin not obtained.

Ctenopelma sanguinea. Type.—Pub. Mus., Quebec. Data from pin not obtained.

Cylloceria lemoinei. Type.—Male, yellow label 470. 2nd Coll. Pub. Mus., Quebec. Lacks apices of antennæ.

Cyrtocentrus quebecensis. Type.—Female, yellow label 693. 2nd Coll. Pub. Mus., Quebec. Antennæ wanting beyond third joint.

Dacnusa crassitela. Type.—Female, yellow label 1299. 2nd Coll. Pub. Mus., Quebec. Antennæ broken, right at scape, left at seventh joint.

Dacnusa spatulata. Type.—Female, yellow label 1305, blue label 669. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tips.

Decatoma basilaris. Type.—Not in Pub. Mus., Quebec, unless under *Isosoma hordei*.

Diastrophus piceus. Type.—White label 3(s); yellow label 1325. 2nd Coll. Pub. Mus., Quebec.

Diastrophus 5-costatus. Type.—Not located.

Dimicrostrophis nigricornis. Type.—Mica point, blue label 759(s); yellow label 1664. 2nd Coll. Pub. Mus., Quebec.

Dineura americana. Type.—Yellow label 639. 2nd Coll. Pub. Mus., Quebec. Lacks left flagellum.

Dinocamptus linearis. Type.—Yellow label 1275. 2nd Coll. Pub. Mus., Quebec. Thorax broken by pin and abdomen crushed out of shape at apex. Sex of type uncertain but believed to be female.

Dinotus acutus. Type.—Yellow label 1385. 2nd Coll. Pub. Mus., Quebec. Badly glued; another specimen in better condition.

Dolichoderus borealis. Type.—Yellow label 1603. 2nd Coll. Pub. Mus., Quebec.

Doryctes atripes. Type.—Female, yellow label 1262. 2nd Coll. Pub. Mus., Quebec.

Doryctes bæticatus. Type.—Yellow label 557. 2nd Coll. Pub. Mus., Quebec. Abdomen wanting.

Doryctes cingulatus. Type.—Female, yellow label 556. 2nd Coll. Pub. Mus., Quebec. Lacks flagella.

Doryctes fartus. Type.—Female, yellow label 558. 2nd Coll. Pub. Mus., Quebec.

Doryctes macilentus. Type.—Female, yellow label 559. 2nd Coll. Pub. Mus., Quebec. No male in collection.

Doryctes pallipes. Type.—Female, yellow label 569. 2nd Coll. Pub. Mus., Quebec.

Echthrus canadensis. Type.—Female, yellow label 468. 2nd Coll. Pub. Mus., Quebec. Some verdigris.

Echthrus luctuosus. Female, yellow label 521. 1st Coll. Pub. Mus., Quebec. Lacks apex of left antenna and abdomen.

Echthrus nigricornis. Type.—Male, yellow label 421. 2nd Coll. Pub. Mus., Quebec. Fair.

Echthrus pediculatus. Type.—Female, yellow label 937. 2nd Coll. Pub. Mus., Quebec.

Echthrus provancheri. Type.—Female, yellow label 1143; printed name label. 2nd Coll. Pub. Mus., Quebec. Considered as Brodie's species. The description was first published by Provancher and there is no indication that it was quoted from Brodie. Provancher indicates that it is his description so the species should, unfortunately, be accredited to Provancher.

Echthrus rubripes. Type.—Female, yellow label 1064. 2nd Coll. Pub. Mus., Quebec. Left wings gone.

Eclytus pleuralis. Type.—Female, yellow label 410. 1st Coll. Pub. Mus., Quebec.

Eclytus robustus. Type.—Female, yellow label 996. 2nd Coll. Pub. Mus., Quebec. Abdomen and part of antennæ gone.

Elis dives. Type.—Female, Cat. No. 1971, U. S. Nat. Mus.

Elis 4-cinctus. Type.—Male, Cat. No. 1972, U. S. Nat. Mus.

Emphytus hullensis. Type.—Harrington Coll.

Emphytus nigristigma. Type.—Yellow label 1543; name label "*Nematus nigristigma*." 2nd Coll. Pub. Mus., Quebec. Provancher's catalogue proves this.

Emphytus pallipes. Type.—Female, yellow label 35. 1st Coll. Pub. Mus., Quebec. Specimen without label, paratype.

Ephedrus completus. Type.—See introduction (Aphidiinæ).

Ephedrus incompletus. Type.—See introduction (Aphidiinæ).

Ephialtes variatipes. Type.—Harrington Coll. teste Davis. Not in Pub. Mus., Québec.

Epirhyssa clavata. Type.—Female, yellow label 1260. 2nd Coll. Pub. Mus., Quebec. Lacks abdomen and apices of antennæ.

Epirhyssa crevieri. Type.—Male, yellow label 388. 2nd Coll. Pub. Mus., Quebec.

Epyris formicoides. Type.—White label "Hull 25-8-84 Rus"; blue label 312; yellow label 1028. 2nd Coll. Pub. Mus., Quebec.

Epyris prolongatus. Type.—Yellow label 744(s). 2nd Coll. Pub. Mus., Quebec. Abdomen gone.

Eriocampa marginata.—See Selandria.

Eriocampa superba. Type.—Female, yellow label 1544. 2nd Coll. Pub. Mus., Quebec.

Erronemus bedardi. Type.—Female, yellow label 658. 2nd Coll. Pub. Mus., Quebec.

Erronemus marginatus. Type.—Female, yellow label 989. 2nd Coll. Pub. Mus., Quebec.

Erronemus tristis. Type.—Female, blue label 594. 2nd Coll. Pub. Mus., Quebec. Left antenna gone.

Eubadizon basilaræ. Type.—Not located.

Eubadizon californicus. Type.—Female, yellow label 1489. 2nd Coll. Pub. Mus., Quebec. Antennæ broken beyond middle, head broken off and mounted on tag.

Eubadizon gracilis. Type.—Female, yellow label 603. 2nd Coll. Pub. Mus., Quebec. One antenna and left hind tarsi broken.

Eucerceris insignis. Type.—Male, white label 77(s); yellow label 1626. 2nd Coll. Pub. Mus., Quebec.

Eucharis gibbosa. Type.—Yellow label 623. 2nd Coll. Pub. Mus., Quebec. Head gone.

Eucoila minor. Type.—Not located.

Eulophus ramosus. Type.—Yellow label 924. 2nd Coll. Pub. Mus., Quebec. Fair.

Eulophus tricladius. Type.—Harrington Coll. Paratype, yellow label 1374; blue label 754. 2nd Coll. Pub. Mus., Quebec. Fair.

Eumenes cinctus. Type.—Female, round disk, yellow label 1643. 2nd Coll. Pub. Mus., Quebec. Poor condition, dirty, etc.

Eumenes crucifera. Type.—Female. Cat. No. 1978, U. S. Nat. Mus.

Eumenes flavopictus. Type.—Female, round disk, yellow label 1644. 2nd Coll. Pub. Mus., Quebec.

Eumenes impunctus. Type.—Female, round disk, yellow label 1642. 2nd Coll. Pub. Mus., Quebec.

Euphorus cephalicus. Type.—Male, yellow label 1118. 2nd Coll. Pub. Mus., Quebec. One antenna gone, other showing 8 joints. Poorly tag-mounted.

Euphorus punctatus. Type.—Male, yellow label 991. 2nd Coll. Pub. Mus., Quebec. Badly pinned; head missing.

Euplectrus lucens. Type.—Yellow label 1369. 2nd Coll. Pub. Mus., Quebec. Fair.

Euplectrus mellipes. Type.—Female, Harrington Coll. Antennæ broken, one complete to fourth funicle joint. Paratype.—Yellow label 1363. 2nd Coll. Pub. Mus., Quebec. Two specimens, both badly glued.

Euplectrus viridæneus. Type.—Yellow label 1382; blue 771(s). 2nd Coll. Pub. Mus., Quebec. Fair.

Eurytoma conica. Type.—Harrington Coll.

Eurytoma nigricoxa. Type.—Harrington Coll.

Eustalocerus fasciatus. Type.—Female, blue label 701(s); yellow label 1281. 2nd Coll. Pub. Mus., Quebec. Lacks flagella.

Eustalocerus longicornis. Type.—Female, yellow label 1280. 2nd Coll. Pub. Mus., Quebec. Antennæ and hind tarsi, broken.

Eustalocerus petiolatus. Type.—Female, yellow label 1083. 2nd Coll. Pub. Mus., Quebec. Left antenna, median and posterior legs on left, missing.

Eustalocerus tauricornis. Type.—Female, yellow label 566. 2nd Coll. Pub. Mus., Quebec. One antenna gone.

Euura nigra. Type.—Yellow label 1538. 2nd Coll. Pub. Mus., Quebec. Another specimen with small, white label "161."

Euxorides vancouverensis. Type.—Female, yellow label 1556. 2nd Coll. Pub. Mus., Quebec. Lacks flagellum.

Exenterus canadensis. Type.—Not located. Allotype.—Female, yellow label 953. 2nd Coll. Pub. Mus., Quebec.

Exenterus hullensis. Type.—Male, Harrington Coll. Pink label "P. 581." Allotype.—Female, blue label 468, yellow label 1238. 2nd Coll. Pub. Mus., Quebec.

Exetastes albitarsis. Type.—Female, yellow label 376. 1st Coll. Pub. Mus., Quebec.

Exetastes brevipennis. Type.—Not in Pub. Mus., Quebec, unless under *Mesostenus promptus* Cress.

Exetastes clavatus. Type.—Not located.

Exetastes matricus. Type.—Female, yellow label 531. 2nd Coll. Pub. Mus., Quebec. Right antenna at scape, left before the middle, anterior and median legs on right at coxæ gone.

Exetastes rufofemoratus. Type.—Female, yellow label 310. 2nd Coll. Pub. Mus., Quebec.

Exetastes rufus.—See *Ceratosoma*.

Exochilum nigrum. Type.—Female, yellow label 279. 2nd Coll. Pub. Mus., Quebec. Left antenna gone, right broken at apex, hind tarsi broken at third joint.

Exochus rufomaculatus. Type.—Female, blue label 562. 2nd Coll. Pub. Mus., Quebec.

Exolytus politus. Type.—Female, yellow label 365. 1st Coll. Pub. Mus., Quebec.

Exyston marginatum. Type.—Not in Pub. Mus., Quebec. Probably returned to collector.

Exyston variatus. Type.—Male, yellow label 324. 2nd Coll. Pub. Mus., Quebec.

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POPULAR AND PRACTICAL ENTOMOLOGY.

A LITTLE KNOWN CUTWORM, *Euxoa excellens* Grt.*

BY ARTHUR GIBSON, CHIEF ASSISTANT ENTOMOLOGIST, IN CHARGE
OF FIELD CROP INSECT INVESTIGATIONS, DOMINION
DEPARTMENT OF AGRICULTURE.

In the Province of British Columbia the caterpillars of *Euxoa excellens* Grt. have been abundant enough during certain years to effect important damage to vegetables of several kinds.

HABITS AND LIFE-HISTORY

The first year of which we have record of this species as an economic pest is 1885. In Fletcher's report for 1903,† it is stated that in 1885, the cutworm was a perfect plague in market gardens around Victoria. Larvæ from British Columbia were also received at Ottawa in 1888, and referred to in Fletcher's report for that year under the name of *Agrotis obeliscoides* Gn. In 1903,‡ the species was again troublesome on Vancouver Island. Since this latter year we have received no reports of injury by this cutworm until 1916, when under date of May 30, the late Mr. Tom Wilson, a valued officer of the Entomological Branch, reported an outbreak in the neighbourhood of Sechelt, which is a short distance north of Vancouver. The caterpillars had cut off various kinds of garden plants and apparently their feeding habits are similar to those of the better known surface-feeding species of the genus *Euxoa*. In some gardens three sowings of spinach, lettuce, onion, etc., had been made before the end of May.

Larvæ received at Ottawa in June, 1916, pupated early in July. Three specimens which changed to pupæ on July 2, produced the moths on July 29 and 30. Other moths emerged in

*Contribution from the Entomological Branch.

†Rept. Ent. & Bot., Exp. Farms, Ottawa, 1904.

‡Idem, p. 183, under *Paragrotis perexcellens*.

August. In the collections at Ottawa there are three specimens which were reared by Fletcher in 1885 from larvae collected in May, the dates of emergence being Aug. 15, 18 and 22, respectively. From our records of captured specimens, the moths of *Euxoa excellens* are on the wing in British Columbia in the latter half of the month of August and during September. The species is widespread in distribution, being known to occur in the United States, in the States of Oregon, Colorado (in September), and California (in September and October). The species was described from Vancouver Island specimens.

Nothing definite is known regarding the early life-history of the insect. From our present knowledge it would appear as if the winter is passed in the egg stage. Possibly during certain seasons hibernation may also occur in a young larval condition.

DESCRIPTIONS.

Mature Larvæ. Length 40 mm. Head 3.0 to 3.2 mm. wide, rounded, pale brown, conspicuously spotted with dark brown; ocelli black. General colour of body, dull grayish-white. Thoracic shield pale brown spotted and blotched with darker brown and divided by dorsal and subdorsal stripes. Dorsal, subdorsal and lateral stripes whitish, all uneven but distinct. Stigmatal band also whitish, uneven, and broken in places. Ventral surface paler than dorsal surface. Tubercles brown, conspicuous, setæ pale. Spiracles black. Anal flap pale brown, blotched with darker brown. Feet pale, the thoracic feet tipped and spotted with brown. Before pupating the markings on the body become faint.

Pupa. Length 18-19 mm., width 6.0-6.5 mm., at widest part; colour chestnut brown, shining. Posterior half of abdominal segments mostly finely pitted. The cremaster bears two stout spines in addition to which there are nearly four other smaller spines. The two stout spines and two of the other smaller ones are in a line; the remaining anterior two which are dorsal spines are strongly reclinate.

The earthen cell is similar to that made by other cutworms of the genus. It varies in size from about 20-22 mm. in length, to about 10-11 mm. in width, inside measurements.

The Moth.—The moth is a rather striking species. With the wings spread it measures from about 37 to 45 mm. in width. The fore wings of the male are dark purplish brown shaded along the lower edge, and in the space about midway between the reniform and outer edge with dull red. The costal area is similarly coloured. In the female all such areas are of a grayish-white colour. The orbicular and reniform spots are conspicuous in both sexes, being whitish with brown centre. A pale, apical spot is also present, as well as a short, pale dash adjoining the dark claviform. The transverse lines are pale. The hind wings in both sexes are whitish tinged with brown. The moth is figured by Hampson, Plate LXVI, 8 (Lep. B.M., Vol. IV).

NATURAL ENEMIES.

From the larvæ received in 1916 we reared at Ottawa several specimens of ichneumonid parasites of two species, namely, *Amblyteles subfuscus* Cress., and *Amblyteles nuncius* Cress.,* both species of which emerged in August.

In addition to these parasites an important percentage of the larvæ were destroyed by the fungus known as *Sorosporella uvella*, the disease being so determined by Dr. Roland Thaxter.

CONTROL.

At the time of Mr. Wilson's visit to Sechelt at the end of May the efficacy of the well-known poisoned bran remedy was explained and its immediate use was urged. Reporting further under date of June 19, Mr. Wilson stated, "I am glad to report that where my instructions were carried out the cutworms were destroyed to the extent of 95 to 100 per cent. I asked the Sister Superior at the school to have the mixture of bran, Paris green and molasses, applied and to leave a certain number of check rows without any treatment. The untreated check rows have been eaten as bare as the road, not a vestige of plant life remaining, while the other rows have not lost a plant since the mixture was applied."

*Both species determined by Mr. W. H. Harrington.

NEW NORTH AMERICAN PHYCITINÆ.

BY WM. BARNES, S.B., M.D., AND J. MCDUNNOUGH, PH.D.,
DECATUR, ILL.

***Rhodophæa bicolorella*, sp. nov.**

Palpi collar and patagia blue-black, thorax and abdomen ochreous; primaries with the costo-basal half blue-black, streaked with pale gray; median area of wing and inner margin broadly to t. p. line ochreous, shading into ruddy-brown before t. p. line; terminal area blue-black, sprinkled with pale gray; t. p. line indicated in costal portion as the outer border of dark area, obsolete in lower half, reniform faintly visible as a large oval filled with paler shading; t. p. line distinct, black, bordered outwardly by white line, rigid to vein 5, then slightly bulging and a little irregular to vein 2, with slight inward angle in fold, preceded by slight dark shading in costal and central areas; terminal dark line; fringes smoky. Secondaries hyaline with slight smoky outer border. Expanse 22 mm.

Habitat.—Christmas, Gila Co., Ariz.; Redington, Ariz. 4 ♂'s. Types, Coll. Barnes.

The type of maculation is essentially that of *hystriculella*, but the ochreous and ruddy central and inner areas render the species easily recognizable.

Genus ***Acrøncosa***, nov. gen. (Type *A. albiflavella*, sp. nov.)

Fore tibia with long inner and short outer claw; ♂ antennæ ciliate, without scale-tuft but with row of minute scale-ridges on upper side in basal portion; labial palpi somewhat ascending, moderate, smoothly scaled; maxillary palpi scaly, appressed, slightly fan-shaped; primaries 11-veined, 2 and 3 well separated and sub-parallel, 4 and 5 from a point; 8 and 9 stalked, 10 separate; secondaries 8-veined, discal vein strongly outcurved, the lower angle of cell being produced to a point, vein 2 well before this angle, 3 from angle, 4 and 5 long stalked, 4 in line with discocellular, 8 distinct, shortly stalked from 7.

This genus is, as far as we know, the first instance of a Phycid with clawed fore-tibiæ, and should be readily recognizable by this feature.

A. albiflavella, sp. nov.

Palpi, head and thorax white, patagia orange with a tinge of this colour on front and on metathorax; primaries white with sparse black sprinkling; inner margin at base orange; t. a. line a broad, oblique band of orange with a small, black spot on its inner side above inner margin; discal spot distinct, black; t. p. line orange close to outer margin and subparallel to same, with small, black costal patch beyond it and faint, black shade preceding it; secondaries hyaline smoky; fringes white; abdomen ochreous. Expanse 20 mm.

Habitat.—Loma Linda, S. Bern. Co., Calif. (July, Aug.) 6 ♂'s, 5 ♀'s. Types, Coll. Barnes.

We have a number of specimens from Ft. Wingate, N. M., very similar in maculation, but with the primaries much more heavily sprinkled with gray-black scales; for this apparently good racial form from the Rocky Mt. region we propose the name *castrella*, our types being 3 ♂'s, 4 ♀'s captured in July-August.

Acroncosa similella, sp. nov.

Very similar to the race *castrella* of the preceding species but larger, with longer primaries which are still more heavily suffused with blue-black than in *castrella*; the orange t. a. band is not continued to costa but stops at median vein, and is followed by a whitish, curved line starting from a similar coloured costal blotch beyond which is a dark, oblique streak; median area heavily shaded with a very prominent black, elongate discal spot; orange t. p. line much reduced, defined inwardly by white line preceded by heavy dark shading; distinct, dark apical dash; secondaries smoky hyaline with a darker marginal border and white fringes. Expanse 22 mm.

Habitat.—Pyramid Lake, Nevada (May). 5 ♂'s, 2 ♀'s. Types, Coll. Barnes.

We also possess the species from Eureka, Utah, (June 2).

Pyla fasciella, sp. nov.

Head, thorax and primaries deep blue-black with considerable bluish iridescence, but with only a trace of the bronze or green metallic scaling found in *scintillans* or *rainieri*; the median portion of the wing is crossed by a broad, darker band, showing

less iridescence, the inner edge of which (t. a. line) is a little less than half way from base of wing and is rather rigidly oblique outwardly, the outer edge (t. p. line) is gently rounded outwardly opposite cell from a point three-quarters from base to apex of wing; secondaries deep brown with darker fringes. Beneath unicolorous black-brown, rather shiny. Expanse 21 mm.

Habitat.—Mt. Shasta, Calif. (July 24-31) (McDunnough) 4 ♂'s, 1 ♀. Types, Coll. Barnes.

This species is the darkest of its group, the lack of bronze or green scaling and the presence of the darker median band rendering it readily distinguishable from its allies; the type specimens were captured at an altitude of about 7,500 feet in very fresh condition, so that the general lack of metallic scaling may be considered normal.

***Pyla viridisuffusella*, sp. nov.**

Head, thorax and primaries heavily suffused with metallic green scaling, the latter with the cross lines broadly marked in blackish, t. a. line outwardly oblique, a little irregular, t. p. line bent somewhat outward beyond cell; at times a faint discal streak is visible. Secondaries deep black-brown; beneath unicolorous black-brown. Abdomen and legs with metallic green scaling. Expanse ♂ 18 mm., ♀ 17 mm.

Habitat.—Tuolumne Meadows, Calif. (Aug. 1-7) 7 ♂'s, 4 ♀'s. Types, Coll. Barnes.

Readily separated from *scintillans* by its smaller size and brilliant, green scaling without any of the bronze shades found in this latter species; it is apparently common at high altitudes throughout the Southern Sierras, as we have a series of it from Mineral King, Tulare Co., as well as our type lot from the Yosemite region.

KEY TO THE SUBFAMILIES OF ANTHOMYIIDÆ

BY J. R. MALLOCH, URBANA, ILL.

I present herewith a key to the imagines of the subfamilies of the dipterous family Anthomyiidæ. The divisions I have adopted differ very considerably from those of European authors, as one may gather from either the names or a study of specimens with

the key as a basis. I have in manuscript keys to the genera of these subfamilies, which I hope soon to publish.

The subfamily divisions here adopted are based upon larval and pupal as well as imaginal characters.

MALES.

1. Sixth vein very short, seventh bent abruptly forward round apex of sixth.....*Fanniinae*
- Sixth vein complete or incomplete, seventh never bent abruptly forward as above.....2
2. Sixth vein complete; under surface of scutellum usually with soft, upright hairs at apex; hind metatarsus with a strong bristle at base ventrally.....*Anthomyiinae*
- Sixth vein complete or incomplete; under surface of scutellum never with hairs at apex; if hind metatarsus has basal bristle the eyes are widely separated and the frons is parallel-sided.....3
3. Centre of pteropleura with a conspicuous group of long hairs; eyes widely separated; palpi conspicuously dilated....*Lispinae*
- Centre of pteropleura without a conspicuous group of hairs....4
4. Eyes usually contiguous or subcontiguous, rarely separated by nearly one-third the width of head, if the latter then the cruciate frontal bristles are absent; sternopleurals 2 to 4 in number, when 3 are present they are not arranged in a nearly equilateral triangle.....5
- Eyes separated by at least the width of head, cruciate frontal bristles present only when the sternopleurals are not arranged in a nearly equilateral triangle.....6
5. Fore femora simple; sternopleural bristles almost invariably 3 (1:2) or 4 (2:2) in number; if only 2 (1:1) are present the prealar bristle is clearly distinguishable.....*Phaoninae*
- Fore femora excavated on under surface near apex and with 1 or more stout thorns basad of the excavation, or if the fore femora are simple the prealar bristle is absent and, as in the previous group, there are only 2 (1:1) sternopleurals present.....*Hydrotæinae*

- . Cruciate frontal bristles present; sternopleurals not in a nearly equilateral triangle; hind metatarsus with basal ventral bristle.....*Fucellinae*
- Cruciate frontal bristles absent; sternopleurals in a nearly equilateral triangle; hind metatarsus without basal ventral bristle.....*Ctenosiinae*

FEMALES

1. Sixth vein very short, seventh abruptly bent forward round apex of sixth; lower orbital bristle directed outward over eye *Fanniinae*
- Sixth vein complete or incomplete, seventh not abruptly bent forward round apex of sixth; lower orbital either directed forward or inward.....2
2. Sixth vein complete; under surface of scutellum usually with soft, upright hairs at apex; hind metatarsus with basal ventral bristle.....*Anthomyiinae*
- Sixth vein complete or incomplete; under surface of scutellum never with soft, upright hairs at apex.....3
3. Cruciate frontal bristles absent.....4
- Cruciate frontal bristles present.....6
4. Pteropleura with a conspicuous group of setulose hairs in centre; palpi much dilated apically.....*Lispinae*
- Pteropleura without a conspicuous group of setulose hairs in centre.....5
5. Sternopleural bristles 2 to 4 in number, if 3 are present they are never arranged in a nearly equilateral triangle.....*Phaoniinae, pt.*
- Sternopleural bristles almost invariably 3 in number, arranged in a nearly equilateral triangle.....*Coenosiinae*
6. Sixth vein complete; hind metatarsus with strong, basal, ventral bristle.....*Fucellinae*
- Sixth vein incomplete; hind metatarsus without distinct basal ventral bristle.....7
7. Sternopleural bristles 2 (1:1) in number; dorso-centrals always 4 in number.....*Hydrotæinae*
- Sternopleural bristles 3 (1:2) or 4 (2:2) in number; dorso-centrals 3 or 4 in number.....*Phaoniinae, pt.*

THE KNOWN NYMPHS OF THE NORTH AMERICAN SPECIES OF SYMPETRUM (ODONATA).

BY E. M. WALKER, TORONTO.

Of the eleven North American species of *Sympetrum*, generally recognized, the nymphs of all but two have been reared or determined with practical certainty. These two are *S. ambiguum* (Ramb.) and *S. madidum* (Hag.). Of the nine others I have examined nymphs of all except *S. corruptum* (Hag.) and *S. illotum* (Hag.). These, however, have been sufficiently described and figured by Needham¹ to make possible their inclusion in the key given below.

In addition to material collected by myself I have examined a considerable number of specimens kindly lent me by Prof. Needham, and also an exuvia of *S. scoticum* Donovan, with the imago which emerged from it, found at Red Deer, Alta., by Mr. F. C. Whitehouse, who kindly gave the specimens to me.

The study of these *Sympetrum* nymphs has been unusually difficult, and the results are far from satisfactory. Variation within the limits of the species is generally so great that it is seemingly impossible, in most cases, to find any constant character by which a particular species may be recognized with certainty. For this reason the key which is given here must be used with a great deal of caution.

I have not included in the key the form which I consider to be typical *S. rubicundulum*, as I have not reared it nor seen nymphs which I could safely assign to this race. I have, however, several specimens of the nymph of *S. rubicundulum decisum* (Hag.) from Prince Albert, Sask., but they differ from Needham's description of *rubicundulum*² in the extreme reduction of the dorsal hooks and are readily separated from my nymphs of *obtrusum*. Needham reared both of these species and found no differences between them. This matter will be more fully discussed later.

The nymph of *Sympetrum* may be characterized as follows: Head rather large, the width across the eyes being little less than that of the abdomen, not more than twice as broad as long; eyes

1 Bull. 68, N. Y. State Mus., 1903, pp. 271-273, No. 16, 17; Bull. 47, N. Y. State Mus., 1901, pl. 25, fig. 1.

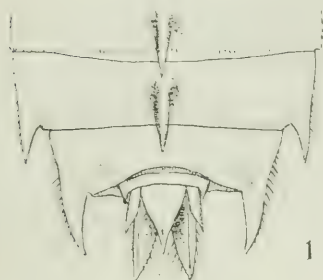
2 Bull. 47, N. Y. State Mus., 1901, p. 525.

moderately to decidedly prominent; lateral margins very oblique, curving into the straight, posterior margin with no indication of an angle. Labium reaching caudad to the middle coxæ, scarcely longer than broad, the middle lobe obtusangulate, mental setæ usually 13 to 15, lateral setæ usually 9-11 but sometimes more, inner margins of lateral lobes with very low crenulations, the marginal spinules in groups of 2 to 4, of which one is much the longest, movable hook slender, rarely more than half the length of the lateral margin. Abdomen ovate, but little depressed, broadest at segment 6, narrowed more abruptly caudad than cephalad; dorsal hooks never present on segs. 1 to 3 nor on 9 and 10, usually shorter than the segments which bear them; lateral spines on segments 8 and 9 or on 9 only, generally shorter than their respective segments; superior appendage triangular, but little longer than broad, acuminate, with a very slender pointed apex, lateral appendages about half as long as inferior appendages, the latter generally acuminate, fine-pointed and decidedly longer than the superior appendage.

The nymphs of *Sympetrum* are very like those of *Leucorrhinia*, and there seem to be no good characters for separating them generically. (See Can. Ent., 1916, vol. XLVIII, p. 414.)

KEY TO THE NYMPHS OF NORTH AMERICAN SPECIES OF SYMPETRUM.

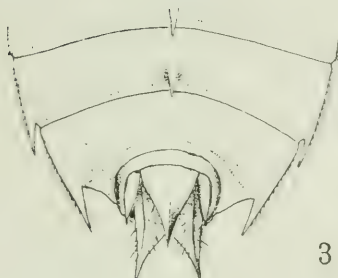
1. Segs. 8 and 9 with lateral spines, dorsal hooks present (except in some individuals of *S. rubicundulum decisum*).....2
 - Seg. 8 without lateral spines, those of seg. 9 vestigial, dorsal hooks entirely absent.....8
2. Dorsal hooks on segs 6-8 as long as the segments which bear them, lateral spines of segs. 8 and 9 subparallel, those of seg. 9 as long as the lateral margins of the segment (not including spine) and reaching back as far as tip of superior appendage; eyes prominent.....3
 - Dorsal hooks shorter than the segments which bear them; lateral spines more or less convergent, their outer margins continuing the general curve of the abdominal margins; those of seg. 9 shorter than the lateral margins of the seg-



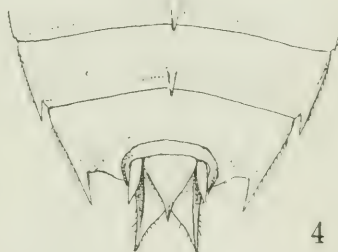
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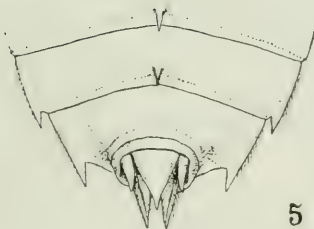
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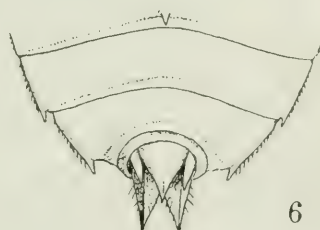
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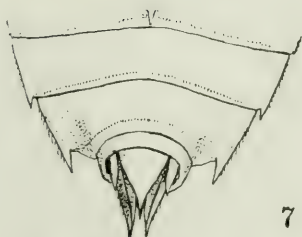
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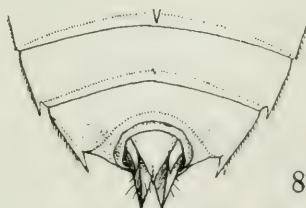
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NYMPHAL STRUCTURES OF SYMPETRUM.
(See p. 418.)

- ment and not reaching as far back as tip of superior appendage; eyes moderately prominent.....4
3. Lateral spines of seg. 8 scarcely twice, those of seg. 9 $2\frac{1}{2}$ times, as long as their basal breadth, outer margins of latter distinctly incurvate; lateral appendages half as long as the inferiors, the latter not acuminate.....*semicinatum*
- Lateral spines of seg. 8 more than twice, those of 9 three times, as long as basal breadth, outer margins of latter nearly straight, lateral appendages less than half as long as the inferiors, the latter apically acuminate.....*vicinum*
4. Lateral spines of seg. 9 not less than two-fifths as long as the lateral margin of the segment, dorsal hooks well developed, slender and very acute, that of seg. 7 nearly as long as the mid-dorsal line of the segment, that of 8 usually more than half as long as the segment.....5
- Lateral spines of seg. 9 not more than one-third as long as the lateral margin of the segment, dorsal hooks smaller and when well developed somewhat stouter and distinctly curved, that of seg. 9 distinctly shorter than the segment, that of seg. 8 rarely half as long as the segment.....6
5. Base of mentum of labium distinctly broader than middle coxæ and somewhat more than one-fourth the greatest width; lateral spines of seg. 9 usually at least half as long as lateral margins of the segment; lateral setæ typically 11.....*costiferum*
- Base of mentum of labium scarcely, if at all, broader than middle coxæ and about one-fourth of the greatest width, lateral spines of seg. 9 two-fifths to one-half as long as lateral margins of the segment; lateral setæ typically 10.....*pallipes*
6. Dorsal hooks present on segs. 4 to 7 or 8, sometimes absent from seg. 4 or 8, lateral spines of seg. 9 about one-third as long as the lateral margins of the segment, lateral setæ 9 to 11.....7
- Dorsal hooks present on segs. 5 to 7 only, vestigial, or absent altogether, lateral spines of seg. 9 about one-fifth as long as lateral margins of the segment, lateral setæ usually 11.....*rubicundulum decisum*

7. Lateral setæ 11, dorsal hooks vestigial or absent from segs. 4 and 8.....*scoticum*
Lateral setæ 9 or 10, dorsal hooks somewhat larger, generally present, though small, on segs. 4 and 8.....*obtrusum*
8. Lateral setæ 9, mental setæ about 13, 7 in the stronger, outer series.....*illotum*
9. Lateral setæ 13-14, mental setæ about 17, 9 in the outer series.....*corruptum*

***Sympetrum semicinctum* (Say).**

I have seen but one specimen of this species, received from Prof. Needham. Its characters seem quite distinctive. The comparatively blunt, inferior appendages distinguish it from all other species I have seen. It was described and figured by Needham in Bull. 47, N. Y. State Mus., p. 523, pl. 25, f. 2.

***Sympetrum vicinum* (Hagen).**

The prominent eyes, large, dorsal hooks and long, slender lateral spines render this an easily recognized species. I have examined a considerable number of specimens from various localities and have reared it several times, both in Ontario and on Vancouver Island. It has been described by Needham (l. c.; p. 522).

***Sympetrum costiferum* (Hagen).**

This species was described by Needham from a single, somewhat collapsed exuvia. The dorsal hooks on segments 6-8 are described as being about as long as their respective segments. They are usually somewhat shorter.

I have not actually reared this species, but I found a freshly-emerged male with its exuvia in a shallow reed-bed at the edge of a lake on Gabriola Island, B.C., Aug. 12, 1913. I also found a number of exuviae on small reeds in a shallow, sand-bottomed lagoon on the Giant's Tomb Island, Georgian Bay, Ont., July 29, 1908. Adults of *S. costiferum* were flying here in abundance. I have also a few nymphs dredged from several localities in Georgian Bay.

The nymph is easily distinguished from that of *S. obtrusum* by the larger size and longer lateral spines and dorsal hooks, the

latter being also straighter and more slender. The lateral setæ vary from 10 to 12, but are 11 in the great majority of cases. The mental setæ vary from 13 to 18 but are usually 14 or 15, with 8 to 10 in the stronger, outer series.

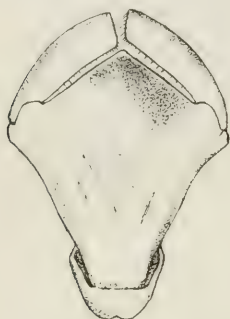


Fig. 40.—*Sympetrum pallipes*, labium of nymph from below.

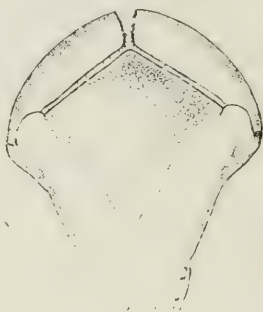
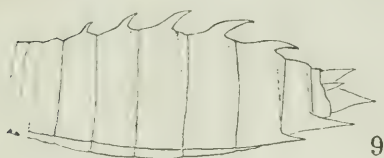


Fig. 41.—*Sympetrum costiferum*, labium of nymph from below.

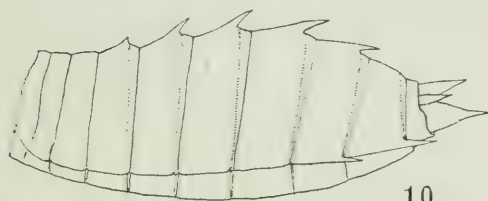
***Sympetrum pallipes* (Hagen).**

This species, which I reared in 1913 from nymphs taken from small pools near Rock City, Vancouver Island, is extremely like *S. costiferum*, though the adults are not closely related. It was described in Can. Ent., 1914, vol. XLVI, p. 373, pl. XXV, Figs. 6-8. The lateral spines of segment 9 are usually, but by no means always, shorter than in *costiferum*, and the lateral lobes of the labium tend to be somewhat more spinulose, the main spinules of the inner margin being accompanied by two or three smaller ones forming a graded series. In *costiferum* these accessory spinules are generally fewer and shorter, some of the larger ones being single. (See Can. Ent., loc. cit., pl. XXV, Figs. 8 and 12) but this character is too variable to be of much value as a differential. The labium is somewhat more slender and more narrowed at base, being similar in form to that of *obtrusum*. This character is apparently a good one but is difficult to appreciate without examining good series of both species. The lateral setæ are usually 10, sometimes 11; the mental setæ vary from 12 to 15.

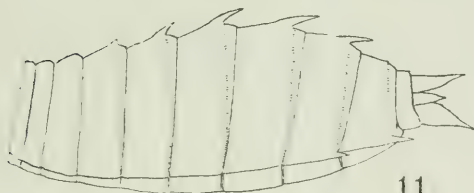
Judging from my limited experience in collecting the nymphs of these two species, it would appear that they are ecologically distinct, *costiferum* being an inhabitant of shallow, marshy bays



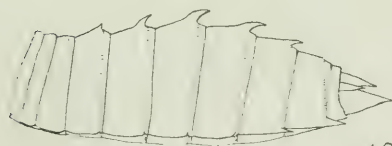
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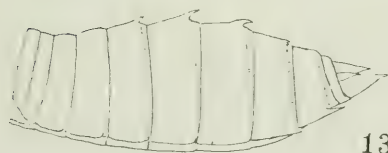
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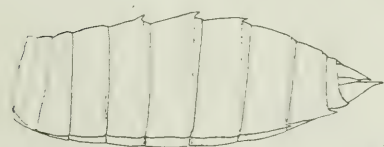
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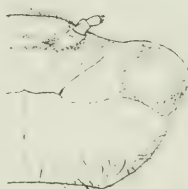
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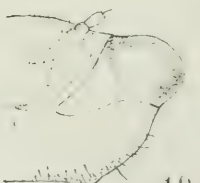
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NYMPHAL STRUCTURES OF SYMPETRUM.

(See p. 418.)

and lagoons, while *pallipes*, like its near relative *obtrusum*, prefers small, semi-permanent ponds and puddles.

***Sympetrum obtrusum* (Hagen).**

The nymph of *obtrusum*, of which I have bred several specimens of both sexes, is very like that of *pallipes* but is somewhat smaller and the shorter dorsal hooks and lateral spines seem to be good characters, though the opposite extremes in the two species approach one another closely. The lateral setae are normally 10, the basal one being, however, very small and sometimes absent. The mental setae are usually 12 or 13, occasionally 14.

***Sympetrum rubicundulum* (Say).**

As already mentioned, the nymph of this species has been described by Needham³ and the characters as given in his description apply equally well to *S. obtrusum*, from which he was unable to distinguish it. Specimens of nymphs and exuviae from a puddle at Prince Albert, Sask., where I found *S. rubicundulum decisum* (Hag.) emerging, differ from *obtrusum* in the great reduction or even absence of the dorsal hooks, and in the smaller lateral spines. These characters appear to be good but I have only seven specimens, and the variation among them is considerable.

During early July, 1917, I found a number of *Sympetrum* nymphs in several small puddles at De Grassi Point, Ont., and before any of them had emerged, tenorals of *S. rubicundulum* were found flying in the vicinity of the puddles. Unfortunately I was unable to attend properly to the nymphs and only two emerged, both females. One of them has an exuvia with extremely vestigial dorsal hooks like the Prince Albert specimens, and the imago seems to differ in no way from *decisum*, while the exuvia of the other is like *obtrusum* and the adult is very similar to the former specimen, but may be *obtrusum*, for I find it sometimes impossible to distinguish between the females of these two species.

These difficulties with the nymphs led me to a closer study of the imagos, with unexpected results. There seem to be two forms of what we have been calling *rubicundulum* in Canada and the Eastern United States. One of these is apparently the same species as the western *decisum*, and this is the form of which I found tenorals emerging at De Grassi Point. It occurs across Canada from Prince Edward Island to British Columbia. The

³ Loc. cit., p. 525.

other I have from De Grassi Point and Toronto only among Canadian localities and also from Bluffton, Ind., and Cedar Rapids, Iowa. It may be only a southern race of the same species, but it appears to me to be distinct in both sexes from *decisum*. The latter is, in some respects, intermediate between the southern form and *obtrusum*, but certainly does not intergrade with the latter. The question of the characteristics and status of these forms of so-called *rubicundulum* will be more fully discussed in a future paper.

Sympetrum scoticum (Donovan).

The exuvia from Red Deer, Alta., already mentioned as having been taken by Mr. Whitehouse with the imago is all I have from North America to represent the nymph of *S. scoticum*, but I found this species emerging from a pond in the Harz Mountains, Germany, in 1906, and have several of the exuviae, though they are, for the most part, in fragments. In most of these there is a minute denticle to represent the dorsal hook of segment 8, but in one of them and in the Red Deer specimen there is no indication whatever of this structure. There is some variation also in the length of the lateral spines, one of them having them scarcely longer than in the Prince Albert specimens of *decisum*. It is very probable that no external characters exist by which *scoticum* and *decisum* can be separated with certainty. The number of lateral setae is normally 11, sometimes 12, and the mental setae vary from 13 to 15, with 7 to 9 in the outer series.

The colour pattern, as in most species of *Sympetrum* is very indistinct and offers no characters of any value.

Sympetrum illotum (Hagen):

The nymph of this western species has not been fully described, but a figure is given by Needham,⁴ who has also noted⁵ the chief characters by which it may be distinguished from its nearest relative, *S. corruptum*.

Sympetrum corruptum (Hagen).

The nymphal characters of this species have been described by Needham⁶ from specimens taken in transformation by Prof. T. D. A. Cockerell at Tempe, Ariz., and Las Vegas, N. M.

⁴ Loc. cit., pl. 25, fig. 1.

⁵ Bull. 68, N. Y. State Mus., p. 272, 1903.

⁶ Loc. cit., p. 271, fig. 16.

EXPLANATION OF PLATES XIX AND XX.

Fig. 1—8.—Apical abdominal segments of *Sympetrum* nymphs dorsal view. 1, *S. semicinctum*; 2, *S. vicinum*; 3, *S. costiferum*; 4, *S. pallipes*; 5, *S. obtrusum*; 6, *S. rubicundulum decisum*; 7, *S. scoticum*; (Red Deer, Alta.); 8, *S. scoticum* (Harz Mts., Germany.)

Fig. 9—14.—Left lateral view of abdomen of *Sympetrum* nymphs. 9, *S. vicinum*; 10, *S. costiferum*; 11, *S. pallipes*; 12, *S. obtrusum*; 13, *S. scoticum*; 14, *S. rubicundulum decisum*.

Figs. 15—19.—Dorsal view of head of *Sympetrum* nymphs. 15, *S. semicinctum*; 16, *S. vicinum*; 17, *S. pallipes*; 18, *S. scoticum*; 19, *S. rubicundulum decisum*.

OBSERVATIONS ON *CHIRONOMUS DECORUS*
JOHANNSEN.*

BY CHI PING, ITHACA, N.Y.

Chironomus decorus Johannsen is a common species found about Ithaca. The larva, pupa, and imago have been described† but its egg stage was missing, and its habits and development were hitherto unknown. The present work records my observations made in the summer of 1915.

Flying and mating.—The adults begin to swarm at sunset and continue into the twilight. At first one or two come out from the grasses, rushes and sedges growing along the shores of pools or ponds where they spent the day. They fly very slowly at first. Later on, as more and more come out and join them, they become more active. As the nightfall commences they can only be seen outlined against the sky. A swarm is often found overhead, from 10 to 15 feet above the ground. The swarm continues to increase in size, until a column may be formed about 5 feet in height and 1 foot in diameter, with its base about 5 feet above the ground.

While engaged in dancing, all the midges have their heads pointing in the same direction, with their bodies moving back and forth and up and down, sometimes with great rapidity. The

*Contribution, from the Limnological Laboratory of Cornell University, Ithaca, N. Y.

†Johannsen, O. A., Bull. 86, N. Y. State Mus., p. 239.
December, 1917

colour of the insects is much lighter than that of other species of the same size so they may be easily recognized upon the wing. From time to time females appear in the swarm. The male chases the female in a spiral course, the two together appear like a single individual. Instead of dropping down, as some species do, they mate in their spiral course toward the summit of the column where they are lost to sight. From the beginning of mating till they disappear in the darkness it requires about 3 minutes.

Oviposition and eggs.—Observations were made during the night of July 30, 1915, on some captured individuals. Oviposition took place about 5.45 a.m. The female alighted on a leaf of Elodea, raising her abdomen by drawing the hind legs close to each other, then flexed her abdomen with its tip pointing downward. On touching the leaf surface several times with the tip of the abdomen, some transparent globules were exuded. This was repeated after short intervals, and finally the abdomen was bent in a greater degree and its tip was pointing forward so as to touch the hind legs. The space between the abdomen and femora was about .5 to 1 mm. Suddenly a brown egg-mass was extruded and deposited on the hind femora. This mass was much condensed. The femora remain together to hold the mass on the dorsal side for 2 or 3 minutes after oviposition was accomplished; then by spreading the legs apart the egg-mass was thrown down on the side of the glass container. The mass gradually expanded, becoming fully distended upon touching the water. Later another egg-mass was found that had been dropped on an Elodea leaf by another female kept under similar conditions. The egg clusters collected at the shores of pools and ponds were found resting on the bottom in shallow water, floating below the surface or attached to some aquatic plants, depending on how the female throws the mass from her hind legs.

Each egg measures about .33 mm. long, and .12 mm. broad. It is more or less cylindrical at the middle and round at both ends. Its colour is pale brown, lighter than the eggs of other species, which I have observed, and hardly changes at all from the time when it is first laid until hatched. It has been estimated that there are about 700 eggs on the average in the whole cluster. The cluster averages 9 mm. in length and 5 mm. in width, slightly

elongated in an oval shape and a little arcuated. At one end of the cluster the gelatinous structure extends into a handle-like projection which is supposed the last portion of the egg-mass. Usually this cord is found to be much twisted and coiled. The unfertilized eggs remain undeveloped (Pl. XXI, fig. 1).

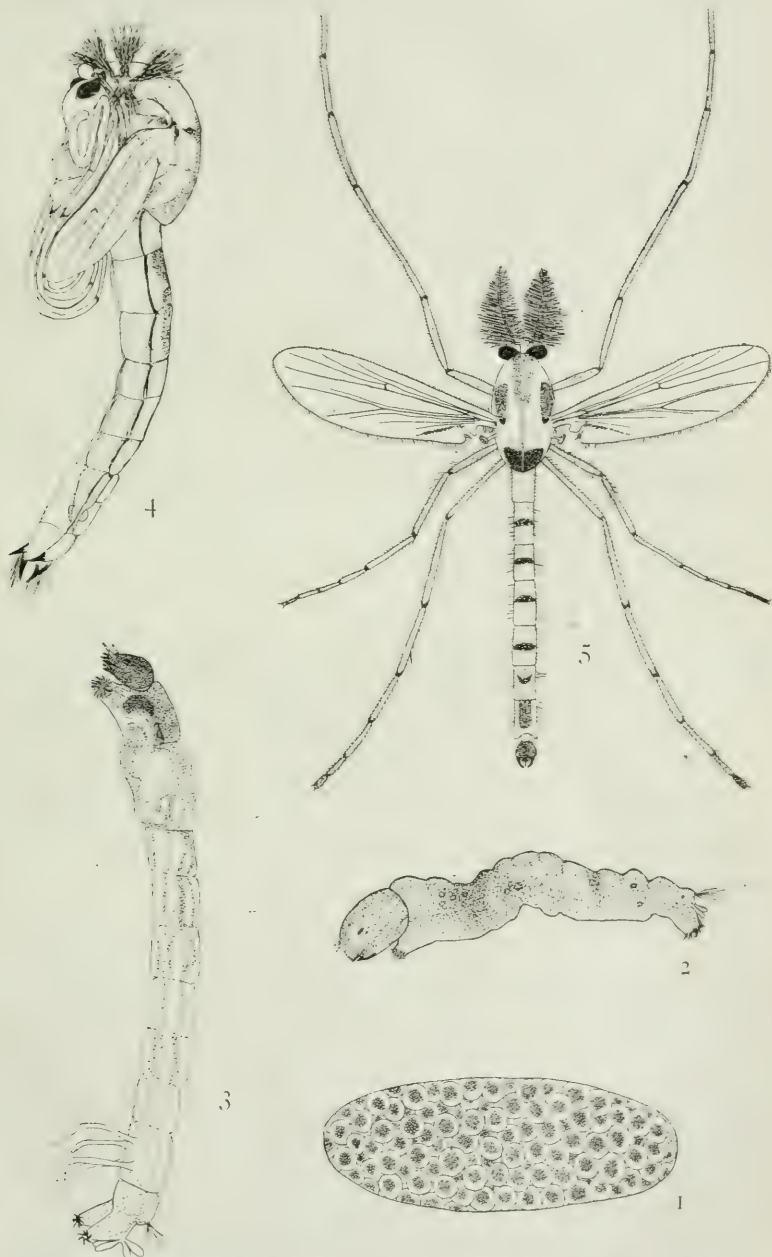
It was often noted that before the fertilized eggs begin to develop, 3 or 4 of them in the cluster were attacked by fungus. The fungous filaments growing on them look like the tentacles of hydra and sometimes become extremely elongated, branching out to connect other eggs nearby in the gelatinous mass. They resemble a network, but are irregularly arranged. This growth checks the development of the eggs and destroys all the substance of them. The fungous disease generally starts from one or two eggs, gradually affecting more eggs and finally destroying the whole mass.

Larva.—When newly hatched, the pale, gray larva measures .8 mm. in length, with its head disproportionally large. The anterior and anal prolegs are short and stout, the claws of the latter pale and transparent. The body segments are not distinct. At this stage there are no appendages at all on the ventral surface of the eleventh segment, while on the caudal end of the twelfth segment there are but two gills. A median tuft of hairs occurs on the dorso-caudal portion of the twelfth segment (Fig. 4).

Later when the larva has attained the size of 1 to 1.5 mm. in length the head is more or less reduced in proportion, the body segments are more distinct and two more blood gills have grown out on the last segment.

When 3 mm. in length, the larva has assumed the general form of a fully grown individual. The body is now much larger in proportion to the head; the mandibles are slightly blackened at their tips, the eye-spots are black instead of red and the head darker. The curved hairs and claws on the prolegs are well developed and more distinct. One of the most noticeable changes in the young larva now is that the blood gills on the ventral surface of the eleventh segment are just budding out. The colour of the larva has now become pink.

The colour of the larva becomes red when it is about 5 mm. long. Excepting for the short gills curled together on the eleventh



CHIRONOMUS DECORUS JOHANNSEN. (See p. 418.)

segment, the larva resembles a fully grown one in every respect. The head is brownish, and when the larva attains a length of 8 mm., setæ have developed on it. There are a few setæ found on the first thoracic segment and the blood gills now hang straight down on the ventral side (Fig. 5).

At maturity the larva measures 11 to 12 mm. in length. The ventral blood gills are about 2 mm. long and longer than the anal legs or any of the body segments. Just prior to pupation the first and second thoracic segments become much swollen.

Growth of Larvæ.—The young larvæ emerged from eggs were placed in the individual test-tubes containing about 4 or 5 cm. of water. These test-tubes were placed obliquely in a dish immersed in water for about half their length to insure uniformity of temperature. They were exposed to sunlight during several hours of the day. Fresh food material and fresh water were added from time to time. A larva which had hatched on August 11, measured .8 mm. in length. On Aug. 19, it was 4 mm.; Sept. 7, 6 mm.; Sept. 11, 7 to 7.5 mm.; Sept. 16, 9.5 mm. The average room temperature was 18 to 19 degrees C. A second larva from another egg was hatched on Aug. 15; on Sept. 11 it measured 7 to 7.5 mm.; Sept. 16, 11 mm.; five days later it pupated. The average room temperature was the same as above. A third one hatched on Sept. 23; on Oct. 1 it reached 1.5 mm.; Oct. 11, 6 mm.; Oct. 23, 10.5 mm. The average room temperature was 10 to 11 degrees C. A fourth one hatched on Oct. 1; on Oct. 8 it measured 1 to 1.5 mm.; Nov. 21, 10.5 mm. The average room temperature was 7 to 8 degrees C.

The larval stage under the conditions stated lasts from 32 to 53 or more days. It is evident from the above that low temperature retards development. In the laboratory the reared larvæ were fed upon the finely ground leaves of *Potamogetons* and of leaves and stems of *Elodea*. Under the microscope I have observed a young larva of about 3.5 to 4 mm. long that had swallowed a piece of *Spirogyra* which filled up almost two-thirds of its alimentary canal.

Larvæ Living Outside of Water.—The larvæ of *C. riparius* have been found to be able to live in mud for a considerable length of time after the water is gone. Similarly the larvæ of *C. decorus*

can subsist without water, provided the condition is not too dry. In the laboratory I have some fully grown larvæ which had made their cases with their secretion and plant materials on the wall of glass containers when the water was present. Upon removal of the water they continue to live in their cases for almost a month until entirely dry.

Pupa.—Upon pupation the larval skin splits along the mid-dorsal line of the thorax, a part of the pupal thorax will emerge first, and the horn-shaped processes on the top of the head, the compound eyes, a part of the antennæ, and the tracheal filaments are now outside the skin. As the development advances, the skin splits further along the dorsal surface, a part of the pupa's body emerges, the compound eyes soon appear in a perfect shape, the tracheal filaments longer, and the legs of the imago have their claws, hairs and segments all visible through the transparent pupal sheath (Fig. 4).

Finally matured, its tracheal filaments are very bushy and white, and its antennæ brownish black. The abdomen is contracted within the pupal skin, leaving the last two segments empty. The genitalia of the adult are visible through the transparent skin. The mature pupa measures about 7 mm. in length and now becomes very active, swimming tadpole-like under the surface of water and moving its depressed abdomen very rapidly back and forth. The thorax closely touches the surface film with the respiratory filaments slightly indenting it. The anal appendages are much flattened and have matted hairs well developed for locomotion. While floating against the surface film it resembles in habit the mosquito wriggler. Sometimes it lies stationary beneath the surface.

Emergence of Adult.—The pupal skin splits longitudinally down the dorsum of the thorax. The head of the adult is pulled backwards and upward, and the mouth-parts, palpi and antennæ gradually emerge. The base of the wings and the legs soon appear. When the front and middle pairs of legs are freed, or almost so, the fly, in trying to raise its body, has its wings immediately straightened out. At this time a greater portion of the posterior legs and the entire abdomen are still retained within the pupal covering. The posterior extremity of the abdomen is always

freed last. The time required for a fly to free itself usually does not exceed one-quarter of a minute, and frequently it has been found that the extrication is accomplished within 4 or 5 seconds. It may even further be hastened if the water is suddenly jarred. In that case the adult can cast off the pupal skin in one second. Sometimes the fly fails to get out of the pupal covering, on account of pulling out the tip of the abdomen too soon. There is a natural order for the extrication of the different parts of the insect's body as mentioned above, any departure from which will result fatally.

Experiments Upon the Longevity of the Adults.—The following experiments were performed on the imagines reared in the laboratory. The imagines were confined immediately after their escape from the pupal skin. Their confinement was near a window where they were exposed to the sunlight during several hours of the day and care had been taken against excessive heat:

I. An imago was kept in a bell jar under which some lumps of CaCl_2 were placed. The humidity inside was reduced practically to zero. The fly lived therein for only 24 hours. (Sept. 23-24).

II. An imago was kept in a jar in which the moisture was maintained in a moderate condition through the evaporation of the water in a small dish placed underneath. It lived for 45 hours. (Sept. 23-25.)

III. An imago was kept in a jar in which the moisture was maintained to saturation by keeping Elodea and Sphagnum, underneath by sticking a few pieces of fully saturated blotting paper to the inner surface of the glass and by wetting the cheese-cloth that covered the top from time to time. The fly favoured by such condition lived for six days. (Sept. 23-29).

Under natural conditions, in the day time they are found in the grasses, rushes and sedges growing on the shore in moist situations, and consequently, there is every reason to believe that the imagines may survive much longer in such places than in confinement.

Effect of Low Temperature, Wind and Smoke upon C. decorus.—The imagines behave themselves very much like other insects with regard to their activity under varying conditions of temperature. In the summer season, if it has been a clear, hot day, they are

always found swarming actively above pools, streams, lake-shores, and also above roadsides during sunset, but in cold weather the swarm is not likely to be seen and their activities have evidently been checked by the low temperature. On Aug. 27, at 5.30 a.m., when the temperature was about 5 degrees C., I observed imagines torpid and unable to fly even when disturbed. On slightly windy evenings, the swarm either does not occur or has a very short duration. Smoke has the same effect on a swarm. It has been found several times that in the Cascadilla Gorge the swarm was often dispelled by smoke from camp-fires even when at a considerable distance.

Number of Generations.—My observations made in the summer and fall of 1915 indicate that probably five generations may be developed in this locality. The number of generations was determined by the finding of egg-masses in ponds and dishes from time to time. The first appearance of egg-masses was in May and the first two weeks of June, the second in the last part of July, the third in the second week of August, the fourth in the first two weeks of September and the fifth in the middle of October.

Enemies.—The midge is apt to be attacked by enemies throughout all the stages in its life-history. The eggs are attacked by the fungous disease as already mentioned. I have observed a young larva preyed upon by a Cyclops. The crustacean held up the thorax of the little larva with its mouth-parts and gnathopods, sucking out the body fluids. After a while, the Cyclops shifted its mouth-parts toward the caudal end. By so doing, within ten minutes, the entire body of the larva was emptied of its contents. At this point another Cyclops came to participate in this work and wrested the prize away from the original possessor.

I have occasionally witnessed bats which preyed upon the adults by flying across the swarm.

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EXPLANATION OF PLATE XXI.

- Fig. 1.—Fertilized egg beginning to develop.
Fig. 2.—Young larva just hatched with only two anal gills.
Fig. 3.—Mature larva.
Fig. 4.—Pupa.
Fig. 5.—Adult male.

LECTOTYPES OF THE SPECIES OF HYMENOPTERA
(EXCEPT APOIDEA) DESCRIBED BY ABBÉ
PROVANCHER.

BY A. B. GAHAN AND S. A. ROHWER, BUREAU OF ENTOMOLOGY,
WASHINGTON, D. C.

(Continued from page 400.)

Figites inermis. Type.—Female, yellow label 619. 2nd Coll. Pub. Mus. Quebec.

Formica pallitarsis. Type.—Yellow label 925. 2nd Coll. Pub. Mus., Quebec. Fair.

Galesus quebecensis. Type.—Yellow label 912. 2nd Coll. Pub. Mus., Quebec.

Glypta californica. Type.—Female, white label 8, yellow label 1292. 2nd Coll. Pub. Mus., Quebec.

Glypta ruficornis. Type.—Male, yellow label 490. 1st Coll. Pub. Mus., Quebec. Bears name label *Glypta macra* Cress.

Glypta rugulosa. Type.—Yellow label 986. 2nd Coll. Pub. Mus., Quebec. Thorax and wings present.

Glypta tricincta. Type.—Not located.

Gonatopus decipiens. Type.—Yellow label 1332. 2nd Coll. Pub. Mus., Quebec. Badly glued.

Gorytes armatus. Type.—Male, old rose label 256(s), blue label 845(s), yellow label 1434. 2nd Coll. Pub. Mus., Quebec.

Gorytes eximius. Type.—Male, white label 29(s), yellow label 1436. 2nd Coll. Pub. Mus., Quebec.

Gorytes laticinctus. Type.—Not located. Probably returned to collector.

Gorytes maculatus. Type.—Male, yellow label 1726. 2nd Coll. Pub. Mus., Quebec.

Gorytes ruficornis. Type.—Female, white label 36(s), yellow label 1435. 2nd Coll. Pub. Mus., Quebec.

Haltichella viridis. Type.—Blue label 110(s); yellow, 1394. 2nd Coll. Pub. Mus., Quebec.

Hedylus politus. Type.—See Introduction (Opiinæ).

Helorus paradoxus. Type.—Female, yellow label 971.

2nd Coll. Pub. Mus., Quebec. Lacks head. Paratype in good condition.

Hemiteles aciculatus. Type.—Male, Harrington Coll. Pink label "P. 426." Lacks right antenna and apex of left.

Hemiteles caudatus. Type.—Female, yellow label 306. 1st Coll. Pub. Mus., Quebec. Lacks abdomen.

Hemiteles crassus. Type.—Male, yellow label 720. 2nd Coll. Pub. Mus., Quebec. Some tarsi gone.

Hemiteles debilis. Type.—Harrington Coll. One antennæ gone, other broken at apex.

Hemiteles declivus. Type.—Female, Harrington Coll. Antennæ gone. Paratype.—Old rose label 33, yellow label 1199. 2nd Coll. Pub. Mus., Quebec.

Hemiteles depressus. Type.—Not located.

Hemiteles gigas. Type.—Male, Harrington Coll. Pink label "P. 411."

Hemiteles humeralis. Type.—Female, yellow label 233. 2nd Coll. Pub. Mus., Quebec.

Hemiteles longicornis. Type.—Female, yellow label 671. 2nd Coll. Pub. Mus., Quebec.

Hemiteles mandibularis. Type.—Female, yellow label 307. 1st Coll. Pub. Mus., Quebec.

Hemiteles mucronatus. Type.—Male, blue label 213, yellow label 1198. 2nd Coll. Pub. Mus., Quebec. Lacks left fore wing.

Hemiteles nigricans. Type.—Male, yellow label 673. 2nd Coll. Pub. Mus., Quebec. Apices of antennæ gone, wings crumpled.

Hemiteles orbicularis. Type.—Not in Pub. Mus., Quebec, unless under *Stilpnus americanus* Prov.

Hemiteles ovalis. Type.—Female, yellow label 316. 1st Coll. Pub. Mus., Quebec. Lacks right and apex of left antenna. Allotype.—Not located.

Hemiteles pallipennis. Type.—Female, yellow label 672. 2nd Coll. Pub. Mus., Quebec. Lacks left antenna and apex of right. Allotype.—In good condition, without labels. 2nd Coll. Pub. Mus., Quebec.

Hemiteles parvus. Type.—Male, yellow label 226. 2nd Coll. Pub. Mus., Quebec. Fair.

Hemiteles ruficoxus. Type.—Female, yellow label 228. 2nd Coll. Pub. Mus., Quebec. Some verdigris.

Hemiteles scabrosus. Type.—Female, yellow label 225. 2nd Coll. Pub. Mus., Quebec. Lacks apex of right flagellum.

Hemiteles semifurus. Type.—Female, yellow label 314. 1st Coll. Pub. Mus., Quebec. Without head.

Hemiteles sessilis. Type.—Female, yellow label 309. 1st Coll. Pub. Mus., Quebec.

Hemiteles subspinosus. Type.—Female, Yellow label 232. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ.

Hemiteles tener. Type.—Male, yellow label 311. 1st Coll. Pub. Mus., Quebec. Somewhat damaged.

Hemiteles utilis. Type.—See *H. depressus* Prov.

Herpestomus pyriformis. Type.—Female, yellow label 200. 2nd Coll. Pub. Mus., Quebec.

Heteropelma longipes. Type.—Cat. No. 1966, U. S. Nat. Mus.

Holcopelte albipes. Type.—Yellow label 1378; blue 774(s). 2nd Coll. Pub. Mus., Quebec. Fair.

Hoplismenus impar. Type.—Pub. Mus., Quebec. Data not obtained.

Hoplismenus scutellatus. See *Ichneumon*.

Hoplismenus stygicus. Type.—Not located, probably returned to collector.

Hoplisus angustus. Type.—Male, yellow label 1688. 2nd Coll. Pub. Mus., Quebec.

Hoplocampa canadensis. See *Selandria*.

Ichneumon absconditus. Type.—Male, yellow label 1210. Mus. Pub. Instruction, Quebec. Right antenna broken, left fore wing missing, thorax crushed but complete, hind tarsi broken, 3 basal joints of right present.

Ichneumon adjunctus. Type.—Female, blue label 93, yellow label 1189? (or one hundred and eighty-nine). 2nd Coll. Pub. Mus., Quebec.

Ichneumon æqualis. Type.—Not in Pub. Mus., Quebec, unless under *Amblyteles nubivagus* Cress.

Ichneumon annulatus. Type.—Male, yellow label 211. 1st Coll. Pub. Mus., Quebec. Right antenna broken off at scape.

Ichneumon approximans. Type.—Male, old rose label 31, yellow label 1193. 2nd Coll. Pub. Mus., Quebec.

Ichneumon aterrimus. Type.—Not in Quebec or Ottawa. Probably returned to collector.

Ichneumon bimaculatus. Type.—Male, blue label 380, yellow label 1580. 2nd Coll. Pub. Mus., Quebec. Right antenna, front legs, left middle leg and left hind wing missing.

Ichneumon bimembris. Type.—Female, yellow label 99. Pub. Mus., Quebec.

Ichneumon calcaratus. Type.—Not in Pub. Mus., Quebec, unless under *Hoplismenus morulus* Say.

Ichneumon caudatus. Type.—Female, yellow label 139. 2nd Coll. Pub. Mus., Quebec. Verdigris.

Ichneumon cervulus. Type.—Male, yellow label 134. 2nd Coll. Pub. Mus., Quebec.

Ichneumon cinctipes. Type.—Not in Pub. Mus., Quebec, unless under *I. navus*. One specimen female, yellow label 161. 1st Coll. Pub. Mus., Quebec.

Ichneumon cinctitarsis. Type.—Male, yellow label 112. Pub. Mus., Quebec. Right antenna missing.

Ichneumon citatus. Type.—Male, yellow label 162. 1st Coll. Pub. Mus., Quebec. Lacks right antenna.

Ichneumon citrinus. Type.—Female, Harrington Coll. Antennae and wings on one side gone, abdomen broken off, mounted on label.

Ichneumon clapini. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon milvus*.

Ichneumon cressoni. Type.—Not in Pub. Mus., Quebec, unless under *I. velox* Cress.

Ichneumon decoratus. Type.—Male, yellow label 135. 2nd Coll. Pub. Mus., Quebec. Right antenna broken.

Ichneumon erythropygus. Type.—Not in Pub. Mus., Quebec, unless under *Platylabus thoracicus* Cress.

Ichneumon fortis. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon centrator* Say.

Ichneumon hæsitans. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon funestus* Cress.

Ichneumon humilis. Type.—Female, yellow label 138.
2nd Coll. Pub. Mus., Quebec. Antennae gone.

Ichneumon lachrymans. Type.—Male, yellow label 136.
2nd Coll. Pub. Mus., Quebec.

Ichneumon lividulus. Type.—Female, yellow label 144.
2nd Coll. Pub. Mus., Quebec.

Ichneumon lobatus. Type.—Not in Pub. Mus., Quebec,
unless under *Ichneumon duplicatus* Say.

Ichneumon magdalensis. Type.—Not located.

Ichneumon marianapolitanensis. Type.—Not in Pub.
Mus., Quebec, unless under *Amblyteles rufizonatus* Cress.

Ichneumon mellicoxus. Type.—Not in Pub. Mus.,
Quebec, unless under *Ichneumon puerilis* Cress.

Ichneumon mucronatus. Type.—Male, yellow label 214.
1st Coll. Pub. Mus., Quebec. Antennae, left front wing, hind legs,
median tarsus on right leg, left anterior tibiae and tarsi missing.

Ichneumon nigripes. Type.—Male, yellow label 987. 2nd
Coll. Pub. Mus., Quebec. Antennae broken near middle.

Ichneumon nigrovariegatus. Type.—Female yellow label
137. 2nd Coll. Pub. Mus., Quebec. Right antenna except scape
gone, left antenna broken off near middle, abdomen glued on.

Ichneumon nitidus. Type.—Not in Pub. Mus., Quebec,
unless under *Amblyteles electus* Cress.

Ichneumon ontariensis. Type.—Male, yellow label 1191,
pink label 30. Pub. Mus., Quebec.

Ichneumon paradoxus. Type.—Not located.

Ichneumon pilosulus. Type.—Female, yellow label 168.
1st Coll. Pub. Mus., Quebec. Antennae broken (one at 4th joint
and one at middle) and left hind leg gone.

Ichneumon placidus. Type.—Male, yellow label 142. 2nd
Coll. Pub. Mus., Quebec.

Ichneumon pomilius. Type.—Male, yellow label 123.
2nd Coll. Pub. Mus., Quebec.

Ichneumon proximus. Type.—Female, yellow label 163.
2nd Coll. Pub. Mus., Quebec.

Ichneumon quadripunctatus. Type.—Not located. Prob-
ably overlooked in Harrington Coll.

Ichneumon saguenayensis. Type.—Not located.

Ichneumon scutellatus. Type.—Male, yellow label 167. 2nd Coll. Pub. Mus., Quebec. Right antenna and right hind tarsus gone.

Ichneumon similaris. Type.—Male, yellow label 113. 2nd Coll. Pub. Mus., Quebec.

Ichneumon stygicus. Type.—Yellow label 167. 1st Coll. Pub. Mus., Quebec.

Ichneumon trizonatus. Type.—Male, yellow label 118. 2nd Coll. Pub. Mus., Quebec.

Ichneumon ustus. Allotype.—Male, yellow label 510. 2nd Coll. Pub. Mus., Quebec.

Ichneumon vagans. Type.—Yellow label 170. 1st Coll. Pub. Mus., Quebec. Apex of right antenna gone.

Ichneumon vancouverensis. Type.—Ent. Branch, Dept. Agr., Ottawa.

Ichneumon varipes. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon w-album* Cress.

Ichneumon vesus. Type.—Male, yellow label 122. 2nd Coll. Pub. Mus., Quebec.

Iphiaulax americanus. Type.—Female, yellow label 1566. 2nd Coll. Pub. Mus., Quebec. Left fore wing loose.

Iphiaulax ornatus. Type.—Female, yellow label 542. 2nd Coll. Pub. Mus., Quebec.

Ischnus impressus. See *Phygadeuon*.

Ischnus lentus. Type.—Not in Pub. Mus. of Quebec unless under *Cryptus limatus* Cress.

Ischnus parvus. See *Hemiteles*.

Ischnus placidus. Type.—Not in Coll. Pub. Mus., Quebec, unless under *Phygadeuon rectus* Prov.

Ischnus pyriformis. See *Herpestomus*.

Ischnus ruficornis. See *Phygadeuon*.

Ischnus scutellatus. See *Platylabus*.

Ischnus variegatus. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon w-album* Cress.

Isostasius canadensis. Type.—Not located.

Joppa canadensis. Type.—Not in Pub. Mus., Quebec, unless under *Ichneumon insolens* Cress.

Labidia columbiana. Type.—Pin with yellow label 1152. 2nd Coll. Pub. Mus., Quebec. Specimen has been destroyed.

Lampronota albifacies. Type.—Yellow label 409. Name label *Lampronota pleuralis*. Cress. 2nd Coll. Pub. Mus., Quebec. Proved by Prov. catalogue.

Lampronota humeralis. Type.—Male, yellow label 417. 2nd Coll. Pub. Mus., Quebec. Lacks antennæ.

Lampronota marginata. Type.—Female, yellow label 954. 2nd Coll. Pub. Mus., Quebec.

Lampronota nigricornis. Type.—Female, yellow label 501. 1st Coll. Pub. Mus., Quebec. Lacks apical half of right antenna.

Lampronota nigripes. Type.—Not in Pub. Mus., Quebec. Probably returned to collector.

Lampronota rufipes. Type.—Provancher did not describe this as a new species. Two females, Pub. Mus., Quebec. One, yellow label 503, 1st Coll.; other, yellow label 532, 2nd Coll. Both under name label *Lampronota rufipes* Cress.

Larra minor. Type.—Male, blue label 77(s), yellow label 1430. 2nd Coll. Pub. Mus., Quebec.

Larra quebecensis. Type.—Not located.

Larra rufipes. Type.—Female, white label 99(s); yellow label 1715. 2nd Coll. Pub. Mus., Quebec.

Leptobates canadensis. Type.—Not in Pub. Mus., Quebec, unless under *Phygadeuon signatus* Prov.

Leptothorax canadensis. Type.—Not located.

Limneria argentea. Type.—Female, yellow label 471. 2nd Coll. Pub. Mus., Quebec. Antennæ broken at tip, median and hind legs on left gone at coxæ.

Limneria basilaris. Type.—Male, yellow label 449. 2nd Coll. Pub. Mus., Quebec. Right antenna and left median leg missing.

Limneria brevicauda. Type.—Female, blue label 252 (apparently, blotted), yellow label 1221. 2nd Coll. Pub. Mus., Quebec. Left antenna gone at scape.

Limneria clavata. Type.—Female, yellow label 301. 2nd Coll. Pub. Mus., Quebec. Lacks left antenna at scape, right at apex, anterior and median legs on left.

(To be continued)

THE SECONDARY HOST OF MYZUS CERASI.

BY W. A. ROSS, DOMINION ENTOMOLOGICAL LABORATORY, VINELAND STATION, ONT.

On looking over some of the recent literature dealing with *Myzus cerasi*, the well known cherry aphid, we find that a difference of opinion exists among entomologists as to whether the species is migratory. Crosby (1) considers that the question is unsettled. Sanderson (2) and O'Kane (3) say that so far as known the cherry aphid has only one food plant. Gillette (4) states definitely that *M. cerasi* lacks the alternating food habit. On the other hand, Quaintance and Baker (5) claim that the species is migratory. How are we to account for these apparently conflicting statements? Is it possible that the species is partially monophagous and partially migratory? Our observations lead us to believe that it is. Apterous forms reside throughout the season on the primary host—cherry—and in addition alate, produced during the summer, migrate to and establish colonies on a secondary host. In Ontario, according to our observations, the favourite alternate host is wild peppergrass, *Lepidium apetalum*. We have made several collections of *cerasi* from this weed and in migratory tests we have repeatedly been successful in transferring the louse from the cherry to the wild peppergrass. No doubt other crucifers serve as summer hosts. In our insectary experiments we have succeeded in establishing colonies of *cerasi* on *Capsella bursa-pastoris*, *Brassica arvensis*, and *Erysimum cheiranthoides*, but so far these results have not been verified in the field.

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December, 1917

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